THE UNIVERSITY OF WASHINGTON

Arboretum bulletin

FALL
1958

Make sure that your property will always be managed efficiently and economically for the benefit of your family. Ask about Seattle-First National's estate planning service . . . available through your branch of our bank.

SEATTLE 1st NATIONAL BANK 1870

SEATTLE-FIRST NATIONAL BANK

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

THE UNIVERSITY OF WASHINGTON

Arboretum bulletin

A JOURNAL OF GENERAL HORTICULTURAL INFORMATION
PUBLISHED QUARTERLY BY THE UNIVERSITY OF WASHINGTON
ARBORETUM FOUNDATION • SEATTLE 5, WASHINGTON

No part of this BULLETIN may be reprinted without the authority of the Arboretum Foundation.

VOLUME XXI, NUMBER 3

Fall, 1958

TABLE OF CONTENTS

SYMPOSIUM ON OAKS

Western Oaks for Western Horticulture . . . . . John M. Tucker 74
Oaks in the Arboretum . . . . . J. A. Witt 80
The Oaks at Hoyt Arboretum . . . . . E. E. Fischer 83
The Michaux Quercetum of the Morris Arboretum . . . . . Hui-Lin Li 84
Oaks at the U. B. C. Botanical Garden, Vancouver, B. C. . . . . J. W. Neill 85
Some Oaks and Their Characteristics . . . . . Clarence E. Lewis 86
A Daimyo Oak on Vashon Island 88
Oregon White Oak . . . . . C. Frank Brockman 89

Mulches—Materials for, and Use in Washington . . . . . S. P. Gessel 90

Notes on Bamboos . . . . . Chauncey E. Wight 93

Arboretum Plant Collections
I—MAPLES 94

"The Arboretum Presents" 96

Arboretum Notebook 100

Book Reviews 104

Hungarian Oak *(Quercus Frainetto; Q. conferta)*
in the Arboretum Collection, 28 ft. tall.

Western Oaks for Western Horticulture

JOHN M. TUCKER*

OUR OAKS of the far west include one of the largest North American members of the genus as well as some of the smallest shrubbery species. Adapted to a wide array of environmental conditions—from desert border to coastal fog belt, from sea level to subalpine slope—oaks are absent from only the most extreme habitats of the western landscape, the actual open desert, the dense coniferous forest of the northwest coast, and the region of severe winters east of the Sierra and Cascades.

Some 27 different species are native to the area embraced by the states of Washington, Oregon, California and Arizona. Fewest in the Northwest, they increase in number in direct proportion to the distance one travels southward and eastward. Thus, Washington has but one species, Oregon has five, California, north of latitude 37 (the northern boundary of Arizona), has eleven, and in the segment of California south of latitude 37, plus Arizona, are twenty-two different native species of oak.

Obviously the greater part of this total of 27 species is better adapted to the warm summers and mild winters of southern California and Arizona than to conditions prevailing in the Northwest. Hence, oaks which would be quite at home in the latter region are probably best sought among the species of the East or Midwest, most of which are reasonably hardy. On the other hand, wherever heat or drought resistance are desirable features, the oaks of the Southwest come into their own.

Considering means of propagation, most oaks can be grown readily from seed. The acorns are commonly sown immediately after being collected since they do not withstand prolonged drying. Methods of vegetative propagation, on the other hand, are reportedly quite difficult. This seems to be especially true with cuttings, even when rooting compounds are applied. Grafting, however, has long been quite a successful method.

In growing oaks from seed collected in the wild, it is important to keep in mind that most species are variable, some of them astonishingly so. A widespread species may occur in a number of forms from one part of its range to another. The Canyon Live Oak *(Quercus chrysolepis),* for example, is a low, spiny-leaved, stiffly branched shrub on dry ridges in the California Coast Ranges, while in cool canyon bottoms of the north coast counties it may become a massive tree 60 feet or more in height. Much of this variation is certainly due to hereditary difference however, and not solely the result of habitat differences from one area to another. Variation is apparent not only over the range of a species as a whole, but to some extent even in a restricted local area also. The variation one sees from tree to tree on a single hillside is certainly due, at least partly, to genetic differences between individuals. To cope with this factor of local genetic variation, the nurseryman interested in growing any of the more variable species would be well-advised to grow sizeable numbers of seedlings, cull rigorously, and select only desired types. Especially choice forms can probably be increased by grafting.

Because of the spreading habit of most of our western species, and the fact that eventually certain of them become large trees, oaks should be given plenty of space in which to develop. The larger oaks are never to be recommended for the small garden. Although they may create a desirable effect during their youth, it is only a matter of time till they become Gullivers amid Lilliputian surroundings. By the same token, although nearly all may make fine street trees, only the smaller-growing species are to be recommended for this purpose where their growing space will be strictly limited. As avenue trees, however, the larger oaks have few peers. Given adequate room in which to develop, and no overhead hindrances, no finer subjects could be

---

*Dr. Tucker, Professor of Botany, University of California, Davis, Calif., has long been a student of the western oaks.

imagined for this purpose than well-grown trees of the stately Valley Oak *(Quercus lobata)* (fig. 8) or Oregon Oak *(Quercus Garryana)*.

Perhaps the most common objection to the use of oaks in horticulture is that they are slow-growing. The general truth of this contention is well-founded, to be sure, although, as will be pointed out later, there are some conspicuous exceptions. It seems to me, however, that in one respect this might well be a very desirable feature rather than a drawback. If a species of compact habit and attractive foliage were grown as a *shrub,* rather than a tree, why shouldn't a slow rate of growth be a point in its favor? Certain of our western oaks (e.g., *Q. chrysolepis)* are naturally amenable to such use inasmuch as they may be shrubby normally in some parts of their range. But aside from cases such as this, the use horticulturally of normally arborescent species as shrubs would seem to open up a broad area for experimentation. For example, the Shingle Oak, *Q. imbricaria,* a midwestern tree which normally attains heights of 50 to 60 feet at maturity, has been very successfully used for clipped hedges in some parts of its native range!*

Eventually some of the naturally occurring hybrids between our western species may be brought into cultivation. The vigorous growth exhibited by some of them would certainly be a point in their favor. As a single example, the Gander Oak *(Quercus* X *Ganderi)* may be mentioned. This hybrid between the California Black Oak *(Q. Kelloggii)* (fig. 8) and the highland variety of the Coast Live Oak *(Q. agrifolia* var. *oxyadenia)* of interior San Diego County, was reported by Carl Wolf, who named it, to have "many of the fine features of *Quercus Kelloggii,* plus semi-evergreen foliage, a vigorous growth rate and hardiness at low elevations."

Of our total of 27 far western species, ten have been singled out for horticultural consideration—nine of them U. S. species, while the tenth is a very attractive little north Mexican oak that almost reaches our border. The species chosen have been determined largely by the esthetic tastes of the author. Some of those included are solid citizens of established reputation, but it must be admitted that for a number of others, judgments as to horticultural adaptability, hardiness, etc., are largely conjectural.

The following key will serve to identify these species—but only these. Its use should be restricted to native species seen or collected in the wild. It does not include species introduced from the eastern states which may be encountered in cultivation on the Pacific Coast. For example, the eastern Red Oak *(Q. borealis),* Black Oak *(Q. velutina),* and Scarlet Oak *(Q. coccinea),* which are all fairly similar to the California Black Oak *(Q. Kelloggii),* would key down to that species! On the other hand, if a native western oak will not key down, it is most likely one of the species not included here.

*See illustration, p. 301, in *Trees for American Gardens,* by Donald Wyman, (Macmillan Co.), 1951.

1. Leaves lobed
   2. Lobes tipped with bristles ..... 6. California Black Oak *(Q. Kelloggii)*
   2. Lobes rounded or blunt, not bristle-tipped
      3. Mature winter buds pale, usually densely hairy ..... 5. Oregon Oak *(Q. Garryana)*
      3. Mature winter buds reddish-brown to medium brown, only slightly (to moderately) hairy
         4. Acorns 1 inch or less in length; shrubs or small trees of the Rocky Mountains and the Southwest ..... 4. Gambel Oak *(Q. Gambelii)*
         4. Acorns 1¼ to 2 inches long; trees of interior valleys in California ..... 7. Valley Oak *(Q. lobata)*

1. Leaves not lobed, the margins entire or merely toothed
   5. Mature leaves glossy above, and moderately glossy on under side
      6. Leaves narrow and willow-like, four or more times longer than wide ..... 9. Osier Oak *(Q. viminea)*
      6. Leaves shorter and broader, the length less than four times the width
         7. Under side of leaf with a tiny tuft of hair on each side of the base of the midrib; acorns maturing in one year .... 3. Emory Oak *(Q. Emoryi)*
         7. Under side of leaf without tufts of hair; acorns biennial, maturing on last year's wood ..... 10. Interior Live Oak *(Q. Wislizenii)*
   5. Mature leaves either glossy or dull above, but not glossy on under side
      8. Leaves bluish glaucous on the upper side ..... 8. Mexican Blue Oak *(Q. oblongifolia)*
      8. Leaves distinctly green, never glaucous, on the upper side
         9. Under side of mature leaves dull whitish ..... 2. Canyon Live Oak *(Q. chrysolepis)*
         9. Under side of mature leaves green, not at all whitish ..... 1. Coast Live Oak *(Q. agrifolia)*

1. *Quercus agrifolia* Née
   California Coast Live Oak

A handsome evergreen tree of coastal central and southern California, with dark green foliage, a short sturdy trunk, and spreading branches forming a broad rounded crown. Under favorable conditions it makes fairly rapid growth, and as a mature tree (after a century, perhaps) may eventually attain a height of 70 feet or so, with a crown spread of 80 to 100 feet. It does best in coastal regions of moderate summers and mild winters. Although it can withstand occasional frost, it does not endure prolonged periods of freezing temperatures. Quite widely used in coastal areas of southern and central California. If summer water is kept to a minimum it does well as a lawn or street tree in the Central Valley (e.g., at Davis), although it does not occur here naturally.

2. *Quercus chrysolepis* Liebm.
   Canyon Live Oak, Maul Oak

Another handsome evergreen tree, with dense, dark green foliage. The small leathery leaves are green above, and covered with a fine golden fuzz beneath when young. This is lost as the leaves mature, and finally the under surface is dull whitish or glaucous. Commonly a medium-sized to small tree (or even a shrub), this oak reaches its largest size in northwestern California and southwestern Oregon, where it may become a tree of picturesque, rugged beauty 60 feet or more in height, with massive spreading branches forming a broad rounded crown. Typically a tree of cool, shady, protected canyons in most parts of California, it will grow in more open sites if given summer water. Several 17-year-old individuals in the University of California Arboretum at Davis, under conditions radically different from those of its preferred habitat, appear to be perfectly healthy and happy. The most vigorous is an erect, narrow-crowned tree about 28 feet in height, the smallest a round compact shrub no more than 6 feet tall! This indicates the breadth of use to which this species may be put. In the high canyons of the Sierra Nevada, as the California botanist, Jepson, long ago remarked, "round balls of Maul Oak shrubs grow on the talus and walls . . . to an altitude of 5,000 to 9,000 feet." In all probability this neat com-

→

California Oaks . . . *Quercus dumosa* (lower right), *Q. lobata* (upper right), *Q. Kelloggii* (left), *Q. Wislizenii* (center)
(Fig. 8) Photo by: WHITIE MARTEN

pact shrubby habit of growth would be retained under cultivation. Used as a shrub, furthermore, its slow rate of growth would be an asset rather than a liability.

This species is rarely seen in cultivation in central or southern California but should be given much more extensive use. Wherever a compact, evergreen tree is desired, the Canyon Live Oak should fill the bill handsomely. It should do well from northern California northward west of the Cascades, where it is probably hardy under all but the most severe winter conditions. A highly variable species—acorn sources should be chosen with care. Select for compact habit of growth, dark glossy foliage, and good general vigor.

3. *Quercus Emoryi* Torr.
Emory Oak

This is the commonest black oak of the Southwest, being one of the most abundant components of the open oak woodland, or *encinal,* on lower mountain slopes and high rangeland from southern Arizona to western Texas and adjacent northern Mexico. Commonly a small tree (at times shrubby), or even a large tree 50 feet or more in height, its small leaves are tardily deciduous, or persist until new growth appears in spring. A mature tree of symmetrical growth, with its furrowed black bark, glossy yellow-green foliage, and rigid, horizontally-spreading branches, is a handsome subject indeed for horticultural purposes. Only infrequently is this oak seen in cultivation. It richly deserves extensive trial not only in the Southwest, but on the Coast as well. It should thrive with some summer watering—it gets summer thunder showers in its native southwestern mountains. In the Pacific Coast states, it should prove hardy west of the Sierra Nevada and Cascades in areas of milder winters.

4. *Quercus Gambelii* Nutt.
Gambel Oak, Rocky Mountain White Oak
Synonyms: *Q. Eastwoodiae* Rydb., *Q. Gunnisonii* Rydb., *Q. leptophylla* Rydb., *Q. nitescens* Rydb., *Q. novo-mexicana* Rydb., *Q. submollis* Rydb., *Q. utahensis* Rydb., *Q. Vreelandii* Rydb.

This is the common, widespread, deciduous white oak of the central and southern Rocky Mountain region. One of the most variable of our western oaks, as its extensive synonymy suggests, it has a remarkably broad range, extending from extreme southern Wyoming and northern Utah southward into the high mountains of northern Mexico. Most commonly shrubby or a small tree, it forms thickets by sprouting from lateral subterranean rhizomes —the "oak brush" of lower slopes in the central Rockies. In some parts of its range Gambel Oak may become a tree of quite respectable dimensions. In the Gila National Forest of west-central New Mexico, for example, the author has seen trees 50-55 feet in height. Gambel Oak has a number of desirable horticultural qualities and it certainly seems worthy of trial on the Pacific Coast. It is probably fully as hardy as the Oregon Oak, *Quercus Garryana*. The glossy, bright green leaves, usually deeply lobed with rounded lobes, and erect habit of growth also bear a close resemblance to the latter. Its smaller stature would suggest potentiality as a street tree.

5. *Quercus Garryana* Dougl.
   Oregon Oak

Oregon Oak is a medium-sized to large tree, under optimal conditions attaining magnificent proportions and in some areas reaching heights of 70 to 90 feet, its great spreading limbs forming a broad, rounded crown. The attractive deciduous leaves are dark glossy green and deeply lobed. This species has the greatest latitudinal distribution of any of our western oaks, extending from southern British Columbia southward to the Coast Ranges of central California. Several isolated colonies occur far to the south, the most southerly being a colony of unhappy, scraggly, shrubby trees which seem completely out of place on a high chaparral-covered ridge in Bouquet Canyon, northern Los Angeles County. These may well have been stranded here following the great ice ages of the Pleistocene, when this oak, and many other northern plants, extended their ranges much farther south than they do today.

Oregon Oak is probably the most hardy of all the Pacific Coast species, and the most widely adaptable for horticultural use in the Northwest. It is a splendid tree for spacious lawns, parks, and avenues in areas where climate and soil are to its liking. The Central Valley of California is not such an area! Intense summer heat, somewhat alkaline soil, and occasional dry, searing north winds spell doom for it when grown in the open at Davis.

6. *Quercus Kelloggii* Newb.
   California Black Oak

California Black Oak ranges in size from a shrubby tree to a large handsome tree as much as 70 feet in height. Of the five black oaks in our area, this is the only one with deciduous lobed leaves having bristle-tipped teeth similar to the well-known black or red oaks of the eastern half of the country. The leaves are a lovely soft pink or light rose as they expand from the bud in spring, a handsome, glossy, bright green when mature, and turn a soft yellow before dropping in the fall. This oak is a frequent companion of the ponderosa pine in the Sierra Nevada, the higher parts of the Coast Ranges, and the high mountains of southern California. Its range extends north into Oregon and south into Baja California. One sees it occasionally used as an ornamental in areas where it is native, but it deserves much wider use. It always seems a bit unhappy in the Central Valley, however, nor does it tolerate coastal conditions very well. This species is probably hardy in most areas of the Pacific Coast states west of the Sierra Nevada and Cascades, and in milder areas east of these mountains as well.

7. *Quercus lobata* Née
   Valley Oak

This is the largest of all our western oaks —a stately, picturesque tree which not uncommonly grows to a height of 70 feet or more (fig. 9). On large old trees the ultimate

(Continued on Page 106)

Quercus lobata, **the Valley Oak at Davis, California**

(Fig. 9) Photo by: L. R. McKinnon

Oaks in the Arboretum

J. A. Witt*

OF the many sections of the Arboretum, the one that perhaps attracts the least attention from the casual visitor is the area north and west of Azalea Way where the oaks are growing. This lack of interest is to be expected, since the oaks cannot compete with the azaleas, flowering cherries and dogwoods growing close by for interest in the spring, yet they represent some of the oldest and largest trees in the Arboretum and give us one of the best shows of fall color of any of our collections.

The original Olmsted plan of the Arboretum called for 320,000 square feet of the north end to be reserved for the *Fagaceae* or the oak family collection, and here they are mainly grouped with the exception of a number on Foster's Island and several odd plants elsewhere. The oaks were among the first plants received by the Arboretum; the main body of our collection was acquired by 1940, in part through the efforts of Mrs. O. B. Thorgrimson, who was instrumental in obtaining many plants and thousands of seeds, and in part from various arboreta, government agencies and interested individuals throughout the world.

We do not have the planting records of the original trees in the collection, which is unfortunate, since such records would be most useful to us in measuring rate of tree growth. We do know they were among the earliest of the Arboretum's plantings; a large number were placed during 1937, 1938 and 1939. We feel that a reasonable average age for the oldest trees would be about twenty years.

It is not the intent of this article to discuss all the oaks growing in the Arboretum, but there are several that have proved to be of unusual interest and merit some mention here.

The largest of our oaks are the three English oaks, *Quercus Robur,* near the north end of Azalea Way, almost due west of the office. These are between 55 and 60 feet tall with a diameter at breast height of between 17 and 18 inches; these antedate the Arboretum by a number of years, as they were probably in the old nursery that was formerly part of Washington Park before it was developed into the Arboretum from 1935 onwards.

The second in size are those very handsome scarlet oaks planted at the northeast corner of the parking lot at the foot of East Lynn Street. They were planted in 1938 and now are over 40 feet tall, with a diameter of 16 inches, and make a very striking display of fall color in October and November.

Two forms of the English oak that are unusual enough to draw attention to themselves regardless of season are the golden leaved oak, *Q. Robur* 'Concordia', with pale yellow-green leaves in early spring and golden-green leaves during the summer, and the fastigiate form, *Q. Robur* f. *fastigiata,* which has an upright narrow head very similar to the Lombardy poplar. There are three of the golden leaved forms in the Azalea bed north of Woodland Garden on Azalea Way, while the fastigiate forms are on Foster's Island, a few hundred feet from the gate.

Among the rarer specimens, the Japanese *Quercus glauca,* an evergreen oak with smooth green leaves, is perhaps the most unusual. Our trees, dating back to 1938, were damaged by the cold November of 1955, but have survived in a weakened condition up to the present. There is a fifteen-foot specimen in the swale opposite the clubhouse and a much smaller specimen on Foster's Island.

In this same area are several other oaks of Japanese origin, *Q. aliena* var. *acuteserrata* forma *calvescens,* that are quite uncommon. These were received as seeds from the Arnold Arboretum at Boston, November, 1937 (fig. 10). The Daimyo oak, *Q. dentata,* from Japan, Korea and China, has what are probably the largest leaves of the oaks in our col-

---

*Assistant Director of the Arboretum.

lection, some measuring nearly eleven inches long and half as much broad. We recently identified two small trees (which had long ago lost their identification tags) as being of this species, most welcome additions to our list of oaks. Many of our trees, incidentally, have lost their labels, especially those on Foster's Island, and considerable work is needed to attach the proper name to the proper tree.

Some mention should be made of the Californian oaks which have been growing well in the Arboretum. These include the Valley oak, *Q. lobata,* just west of the clubhouse; *Q. chrysolepis,* the canyon or maul oak, in the same general area; *Q. Wislizenii,* interior live oak, left in the old nursery section south of the lath houses, where it thrives despite the lack of care, and *Q. Kelloggii,* California black oak, in the same nursery row. Both the last two, which are now 23 feet tall, and the Valley oak, originated from seeds received from Chico, California in October, 1940.

Several of the chaparral or shrubby oaks from California and southern Oregon offer considerable promise as broadleaved evergreen shrubs for a hot dry location. We have none large enough to plant out as yet, but are building up a stock of young plants in the lath house and nursery. Among the best are the huckleberry oak, *Q. chrysolepis* var. *vacciniifolia,* and the Sadler oak, *Q. Sadleriana.* The former has a small holly- or osmanthus-like leaf and attractive bronzy new foliage; the latter with larger leaves, green above and gray below. Both will reach an ultimate height of between three and six feet.

Below is a list of the more conspicuous oaks now growing in the Arboretum, along with their present height (July, 1958) and other pertinent information. The native home of these oaks is given under *Notes* when it is other than North American. We hope that this progress report on their growth will interest the present reader, and, even more, will be a valuable record for future studies of these handsome trees.

Name	*Common name*	*Height*	*DBH**	*Year Planted*	*Notes*
Quercus acutissima		9′-10′	**	'53	N. E. Asia (fig. 10)
alba	White oak	16′	**	'38	Growing under larger tree
aliena var. acuteserrata		23′-27′	**	'38	N. E. Asia
aliena var. acuteserrata f. calvescens		32′	6″-7″	'38	Damaged by cold 11/55
Bebbiana	Bebb oak	27′	**	'38	Hybrid between burr and white oak
bicolor	Swamp white oak	29′	8″	'38	In swampy location
borealis	Northern red oak	25′	**	'38	
Bushii		29′	7″	'38	Hybrid between blackjack and black oaks. Beautiful brown fall color
chrysolepis	California live oak	5′	**	'53	Cut back by cold 11/55
coccinea	Scarlet oak	43-46′	13-16″	'38	Among the best of our oaks
dentata	Daimyo oak	17′	**	'38	Growing in poor site. China; Japan
dumosa	California scrub oak	11′	**	'51	Beautiful gray foliage, evergreen
exacta		22′	**	'38	Hybrid of shingle and pin oaks
Frainetto		28′	4″-5″	'38	S. E. Europe (see Cover)

Name	*Common name*	*Height*	*DBH**	*Year Planted*	*Notes*
Garryana	Oregon oak	15′	**	'46	The native oak; growing under taller tree
glauca		15′	**	'38	Winter damaged 11/55. Japan; China
ilicifolia	Scrub oak	16′	**	'38	
imbricaria	Shingle oak	25′-34′	4″	'38	Good fall color
Kelloggii	California black oak	23′	7″	'38	In old nursery section
lobata	Valley oak	22′	4″	'38	Damaged by cold 11/55. Another 27 ft. in old nursery
Ludoviciana	St. Landry oak	18′-22′	**	'48	Hybrid of willow and Spanish oak
macrocarpa	Burr oak	24′	4″	'38	Several plants from these seeds are hybrids
marilandica	Black jack oak	16′	**	'38?	May be hybrids; others of this species damaged by cold 11/55
Michauxii	Basket oak	33′	7″-10″	'38	Among the finest of our oaks
Muhlenbergii	Yellow chestnut oak	13′	**	'38	Growing under taller tree
nigra	Water oak	34′	5½″	'38	
palustris	Pin oak	38′	9½″	'38?	Early fall color
phellos	Willow oak	14′-18′	**	'51	Probably hybrids
Robur	English oak	34′	6″	'38	Europe
Robur 'Concordia'	Golden leaved English oak	13′	—	'51	Handsome golden foliage
Robur var. fastigiata		27′	—	?	Narrow crown
Rudkinii		13′	—	'54	Hybrid of willow and black-jack oak from N. C. A seedling tree
stellata	Post oak	9′-12′	—	'38	
suber	Cork oak	2′-3′	—	'57	Replacements for older trees killed 11/55; S. W. Europe; N. Africa
variabilis		30′-32′	4″	'38	N. China (fig. 10), Korea and Japan
velutina	Black oak	27′-30′	4½″	?	

**DBH* diameter at breast height
**less than 4″
†the year 1938 is used to indicate those trees planted prior to 1942.

THE ARBORETUM UNITS
ANNUAL FALL PLANT SALE
THURS., OCT. 9, 1958—9:00 a.m.
AT THE ARBORETUM

Asiatic Oaks. *Quercus acutissima* (lower right), *Q. aliena* (left), *Q. variabilis* (upper right)
(Fig. 10) Photo by: WHITIE MARTEN

The Oaks at Hoyt Arboretum

E. E. Fischer*

SINCE at Hoyt Arboretum our specialty is the growing of gymnosperms, the broad-leaved trees are more or less incidental and do not receive the care and attention which they should have. For this reason our oaks, of which we have seventeen distinct species, are not characteristic of the "sturdy oak" of song and poem. Due to an over-amount of shade created by the existing towering Douglas firs, our oaks are, for the most part, "long and lean." However, future plans call for the removal of most of the existing firs, and this should give the oaks and other broadleaved trees a more normal appearance.

We have done some experimenting with the cork oak *(Q. Suber),* with only mediocre results. Our first planting in 1945 was frozen out during the severe winter of 1948. However, these trees developed sprouts and were well on their way again when the premature freeze of '55 laid them low. Recent inspection shows they again have developed sprouts and should now survive any normal winter temperature.

The oak most difficult to transplant was the canyon live oak *(Q. chrysolepis)* and numerous attempts to establish this tree from seedlings resulted in failure. As a last resort, seeds were planted in their permanent location, and the resultant trees are doing well.

The New Mexico oak *(Q. Gambellii)* shows much promise at the arboretum and survived the '55 freeze in good shape. These oaks apparently are shade tolerant and, despite the proximity of towering firs, they are probably putting on greater growth than most of our other oaks.

The Eastern Post Oak *(Q. stellata)* shows rapid growth for an oak, and this group at

(Continued on Page 103)

*Curator of the Hoyt Arboretum, Portland, Oregon.

The Michaux Quercetum of the Morris Arboretum

HUI-LIN LI*

THE Michaux Quercetum is a comprehensive living collection of all species and varieties of oaks adapted to the Philadelphia climate. It is established on the grounds of the Morris Arboretum with the cooperation of the Northeastern Forest Experiment Station of the Forest Service, U. S. Department of Agriculture. The collection constitutes a memorial to Francois Andre Michaux, the noted French botanist and an early authority on American trees, notably oaks. He bequeathed the Michaux Fund to the American Philosophical Society for furthering the progress of forestry and agriculture, which in part financed this undertaking.

The purpose of the collection is to establish a documented assemblage of oak germplasm that over the years will have the maximum practical usefulness in theoretical and applied research. It is a collection of species and not of presumed hybrids. In every case, the starting point is about 100 acorns from individual wild trees in natural stands, accompanied by herbarium specimens and pertinent records. In the same locality, if possible, two separate collections are made from two trees to provide the minimum replication necessary to indicate the possible existence of races within the species. In species of wide distribution, separate collections are obtained from as many different areas as possible.

The seedlings are maintained in the seed bed for one year and in the nursery up to four years. Each collection is intensively studied, especially as to variability and for any evidence of hybridity.

The project was started in 1953. Many agencies and individual botanists and foresters throughout the country cooperated in obtaining the seeds and herbarium specimens according to our procedure. A number of collections were also obtained from Canada and European countries. It has not yet been possible, however, to extend the collecting work to eastern Asia.

In the last five years, over 250 seed lots were received representing about 40 species, from 33 states in the United States and seven foreign countries. The list of species of oaks represented covers practically all the common ones in this country, with a fair representation of each from different localities within its geographical range.

Most of the west coast species as well as those from Texas and Florida are not hardy in the Philadelphia area. However, all seedlings are recorded for their mortality and other measurements are taken for population studies. Therefore even those species that cannot be represented in the permanent collection provide data for study in their seedling stage.

Since 1956 young trees have been planted out in a permanent position in the Arboretum according to a carefully determined plan. The site selected is a broad strip along the northwest boundary, along the Widener estate and Stenton Avenue. The saplings are planted 20 feet apart to provide space for their future development. In order to facilitate comparative studies, representatives of a given species from various localities are placed in the same section. Each seed lot is being replicated three times to compensate for possible difference in soil and to make possible statistical studies. Open spaces in the area allotted to each species are being left to be filled in by future plantings.

This area, the only space available for planting oaks, however is underlain by limestone, and as its surface is relatively flat, mineral rich, circumneutral soils have accumulated here. Many of the oaks can thus be expected to become chlorotic and to fall prey to diseases in a few years. To insure success

*Dr. Li is taxonomist at the Morris Arboretum of the University of Pennsylvania, in Philadelphia.

to the project, a duplicate collection is established on the grounds of the Longwood Foundation, Kennett Square, Pa. Their land, largely sub-acid, is well suited to the growth of the majority of our oaks. This, however, is a forest planting, with 8 x 8 feet spacing, very different from the widely spaced specimen planting at the Morris Arboretum. Duplicate collections of most seed lots are also established at the Holden Arboretum, Ohio Agricultural Experiment Station, University of Washington Arboretum, College of William and Mary and University of Wisconsin.

The severe drought of 1957 caused considerable die-back among the newly planted specimens at both the Morris Arboretum and Longwood. As yet it is uncertain whether or not these plants will become permanent losses.

Oaks at the U.B.C. Botanical Garden, Vancouver, B. C.

J. W. Neill*

OAKS have long been featured on the campus and Botanical Garden of the University of British Columbia at Vancouver. Early landscape planners realized their magnificence for boulevard and lawn specimen use and although the campus is, relatively speaking, a young one, these trees are now reaching a state of semi-maturity and are valued highly for their beauty of form and special seasonal effects.

Most prominent feature is the avenue of Red Oaks, *Quercus rubra (Q. borealis maxima),* lining both sides of the Main Mall, creating a most interesting vista of mountains and sea to the north. These trees are lively in effect throughout the seasons, from the bright yellow of early spring foliage to the intense red and bronze of their leaves in the autumn.

In the contrast to this the double row of English Oaks, *Quercus Robur,* massed in the centre of the East Mall boulevard, presents a sombre aspect at all times. Specimens of the Scarlet Oak, *Quercus coccinea,* and White Oak, *Quercus alba,* are prominent as landscape features on the campus and oaks have been planted in various situations by graduating classes to remain for many years as living mementos of the succeeding generations of University students.

In the systematic arboretum are found 30- to 40-year old specimens of *Q. coccinea, Q. Garryana, Q. macrocarpa, Q. Michauxii, Q. palustris, Q. prinoides, Q. stellata* and *Q. velutina.*

During the last few years steps have been taken to increase the collection of oaks by the U.B.C. Botanical Garden staff. Young trees of the following species have been acquired and are in the nursery for growing on: *Q. Cerris, Q. Frainetto, Q. hispanica* var. *Lucombeana, Q. Ilex* var. *latifolia, Q. kewensis, Q. petraea* var. *columna, Q. pontica, Q. pubescens* f. *crispata, Q. robur* 'Concordia', *Q. robur* var. *fastigiata* 'Cupressifolia', *Q. robur* var. *fastigiata* 'Sunset', *Q. robur* 'Pendula', *Q. rubra* 'Aurea' and *Q. Turneri* var. *pseudoturneri.* These will find a permanent home on the University Campus as an integral part of the Botanical Garden.

From seed, mainly through the seed exchange services of Botanical Gardens and Arboreta in Japan, Great Britain, continental Europe and the United States, successful young plants of the following species are now in the nursery frames: *Q. acutissima, Q. gilva, Q. glauca, Q. myrsinaefolia, Q. phillyraeoides, Q. alba, Q. bicolor, Q. chrysolepis* var. *vacciniifolia, Q. Douglasii, Q. Garryana* var. *semota, Q. Ilex, Q. pedunculata* 'Filicifolia', *Q. pedunculata* 'Elegantissima, *Q. sessiliflora, Q. robur* 'Atropurpurea', and *Q. Cerris* 'Cana minor'. Some of these, of course, do not come

(Continued on Page 110)

*Assoc. Professor of Horticulture and Assoc. Director of the Botanical Garden.

Some Oaks and Their Characteristics

CLARENCE E. LEWIS*

AFTER scouring many catalogs of American Nurserymen, I found that there were twenty-one species and varieties of oaks available for purchase. This seems like a rather extensive list, but in reality the bulk was centered around four or five species. One species led all the rest, namely, pin oak *(Quercus palustris)*.

The oaks are generally not suited for the small home and the narrow street, nor should they be relegated to the woodland. Their possibilities in the landscape are many, but they are not so readily usable that any home, street, or park should accept them.

The oaks which are most readily available in the trade and have been widely used for landscape purposes are pin oak *(Quercus palustris)*, red oak *(Q. borealis)*, scarlet oak *(Q. coccinea)*, and willow oak *(Q. Phellos)*.

The pin oak is found mostly in bottomlands and can be detected by the persistence of low hanging branches, some of which have been dead for years. Because of the tendency for the branches to droop, it is not a tree to be used close to streets where the branches will, in time, obstruct traffic. In some cases the lower limbs have been removed at a point high enough so they will not hinder the passing of cars or people. The removal of lower limbs is sometimes necessary because they will eventually pile up on one another causing the death of some branches. The tree, when allowed to gracefully spread and hang its branches, makes a fine pyramidal tree for parks, large lawn areas, the center panel of boulevards, and in relationship to large structures such as schools and public buildings. There is a need to thin lower branches even under these conditions.

It is one of the less difficult oaks to transplant but may, under alkaline soil conditions, develop a chlorotic appearance. If drainage is not the main problem, the yellowing of leaves can be corrected by using DTPA Chelates as a spray, or as a soil treatment.

The fine textured appearance, the graceful aspect of this large tree, and the autumn color that is often scarlet suggest that it is a desirable tree for the right situation.

The red oak, *Q. borealis (rubra)*, is one of the best of the large trees but needs room to spread its branches. It is a fairly fast growing oak, once it becomes established, that is quite clean and not difficult to transplant. The latter cannot be said of all the oaks. The red oak does prefer a soil that has at least average amounts of organic matter, particularly during its early years. This is not a tree for most streets or small home grounds because it will eventually spread as much as sixty feet, and more. If used as a street tree, then a spacing of sixty feet should be allowed, and the trees should be no closer than sixty feet from an intersecting street. The best planting area is between the sidewalk and home, or in a center panel that is at least ten feet wide, and then the trees must be headed high enough to easily accommodate the passing of cars and trucks if necessary.

The scarlet oak, *Quercus coccinea*, is similar to the red oak in the sense of having a round head and a rather extensive spread. It is, however, more open. Its fine texture resembles that of the pin oak except the leaves are usually broader and the base has more of a straight line than a taper. This tree of excellent scarlet to red fall color is one of the most attractive of the large trees during the autumn. Its use is similar to that of a red oak, where it has room to spread, but it does not transplant as readily. Its foliage also resembles that of the southern red oak, *Q. texana*.

A species whose foliage looks less like an oak than most of the others is the willow oak, *Quercus Phellos*. The narrow unlobed leaves with a bristle tip have about the same distant

*Associate Professor, Department of Horticulture, Michigan State University, East Lansing, Michigan.

texture as willows but the weeping tendency is not as apparent, although it has the pin oak tendency to droop. It has been successfully used both as a street and lawn tree but one should give the tree room to spread, and plan to remove lower limbs if traffic must pass beneath. The willow oak transplants without any great degree of difficulty and will withstand colder temperatures than most people realize, ten degrees below zero. It has found its way into northern plantings.

At one time the blackjack oak. *Q. marilandica,* was considered impossible to transplant, but more recent experiences have proven that this is not entirely true. Older trees are still difficult, however. It is a smaller tree, usually under forty feet, and possesses a black kernelly bark and broad tipped, extremely glossy leaves. Although not readily available in the trade, it is worthy of being mentioned because of its size and adaptability to inferior, well drained soils. It is a possibility for a small home lot.

Another oak that is available in the trade and does not exceed a height of fifty feet is the sawtooth oak, *Quercus acutissima.* This round headed tree with chestnut-like *(Castanea)* leaves and of Asiatic origin can be justifiably used in the landscape.

The most variable is the English Oak, *Quercus Robur,* and one that should have a greater place in the American landscape than it now has. Of the variations, the pyramidal or upright form, *fastigiata,* has the most promising future. This narrow columnar grower can be used close to large buildings where height is needed to adjust the building to its surroundings. Other variations of the English oak, but not readily available, include the spleenwort English oak *(Q. Robur* 'Asplenifolia') whose leaves are pinnately divided, fern-like, and of varying shapes to the lobes; the fernleaf English oak *(Q. R.* 'Filicifolia'), similar but lobes pointing more forward and crisped; the longleaf English oak *(Q. R.* 'Heterophylla') which bears some resemblance to the spleenwort form except the lobes are more irregular and they curve; the golden English oak *(Q. R.* 'Concordia'); the weeping English oak *(Q. R.* 'Pendula'); the purpleleaf English oak *(Q. R.* 'Atropurpurea'); the lobeless English oak *(Q. R.* 'Holophylla'); the variegated Engish oak *(Q. R.* 'Variegata') that has leaves variegated with white, and there are many others that are not too different from those already mentioned. Dr. Rehder stated that there were more than forty garden forms, which indicates the complexity of the species.

Other important things to consider about the English oak and its varieties are (1) the leaves remain green longer than most oaks and are late persisting, (2) the bark is tight and clean, (3) the bark is also gray to dark gray giving a pleasant contrast with the neat appearing leaves, (4) there is no noticeable autumn coloration other than green, (5) it is usually a round to oval headed tree with a short main trunk but can be headed higher.

This tree is considered by some to be difficult to grow in this country, particularly where temperatures drop lower than five to ten degrees below zero. My observations do not justify this since I have seen many fine specimens growing where the temperatures had dropped to ten and fifteen degrees below zero. There are reasons other than low temperatures that affect the health of a tree.

The Turkey oak, *Quercus Cerris,* slightly resembles the English oak in form and has a bark that also has a similar dark gray tone. The fruit cups, however, are covered with many recurved scales that give a ragged appearance. The English oak cup is clean. The buds at the tips of the stems are also ragged looking which is caused by persistent stipules. This provides a noticeable contrast to the clean buds of *Q. Robur.* The Turkey oak is less hardy although it has taken temperatures to ten degrees below zero. There used to be some very large specimens in Central Park of New York City, and they may still be there.

Of the oaks used in some of the southern plantings, it would be impolite to ignore the water oak, *Q. nigra,* and the live oak, *Q. virginiana.* The water oak, with its round head and nearly entire deciduous leaves (often 3-lobed at apex), is certainly adaptable to

wide avenues where the crown has a chance to spread. In contrast the evergreen live oak, which is easily transplanted while young, is attractive because of the dark green leaves and whitish undersides. It, too, must have room to spread its broad crown. The live oak, of course, should be used where temperatures stay above five degrees Fahrenheit. It has taken colder conditions but the leaves are usually killed. Neither tree should be used on small places because of their eventual spread.

The black or yellow oak, *Q. velutina,* and the white oak, *Q. alba,* which are both found over the eastern half of the United States, are not used ornamentally to any extent. The black oak adapts itself to porous soils that are very low in organic matter and it, like the white oak, is more difficult to transplant than some of the others. Neither would ordinarily be planted on the small home grounds but one should take advantage of those that exist.

A southeastern oak that has proven hardy in some of the northern states is the southern red or Spanish oak, *Q. lyrata*. It seems to grow well as far north as Long Island and New Jersey. Dr. Wyman states that a large specimen is growing in the Arnold Arboretum and has been there for the past fifty years. Its foliage is quite attractive in that it is different. The lower half of the leaf is often entire and broadly cuneate. Its use would be similar to many of the other large oaks.

Quercus variabilis, the oriental oak, provides a landscape interest with its cork-like bark and foliage that is long and narrow with shallow lobe-like serrations.

The oak, whose foliage resembles some of the broadleaved evergreens, is the shingle oak, *Q. imbricaria*. It reputedly withstands pruning and shearing, so that it can become a clipped hedge or windbreak. It is hardier than many realize, withstanding temperatures to ten and fifteen degrees below zero. Its lustrous unlobed leaves, that are at least twice as broad as the willow oak, help provide interest.

Why use oaks? They are durable, though not without insect and disease problems, and if cared for can last for several generations. The oaks are for homes on generous sized lots, broad streets, parks, schools, college campuses, and any areas where large trees are needed to provide a pleasing scale relationship, as well as a maturity that comes with their nearness. When the trees are limbed high the deep root systems allow for the underplanting of many shrubs and small trees. Most oaks provide more than shade, they also include in their repertory a majesty that is a part of their impressionistic history.

A Daimyo Oak on Vashon Island

In July 1957 Mr. William D. Reuter of Burton, Vashon Island, Washington, brought in for identification a specimen of an oak tree growing on his farm.

This, which was particularly remarkable for its large leaves, we determined to be an example of the Daimyo oak *(Quercus dentata),* a native of Japan, especially the northern island Hokkaido, of Korea, Manchuria, and northern and western China. Since this is a rare species in cultivation we asked Mr. Reuter for information as to its history.

When he bought the farm in 1941 it was about ten feet tall, having been given by a missionary from China to the previous owners of the property, Mr. and Mrs. Charles E. Carey; it is now about thirty feet in height, in vigorous health, having suffered no damage from the abnormally early freeze in November, 1955. The leaves, which average 9 to 10 inches long and 4 to 5 inches wide, persist through the winter and do not fall until March. Unfortunately, no fertile acorns have been produced by this solitary tree, so that any propagation will have to be by some vegetative method.

The soil in this site is light and sandy for 2-3 feet in depth, with clay beneath which remains wet during the winter months. Judging by the growth made in the past seventeen years the tree is quite satisfied with these conditions and is a very interesting local example of its kind.

B. O. M.

Oregon White Oak*

C. Frank Brockman

THE somber character of Northwestern forests, composed largely of coniferous evergreen trees, is highlighted here and there by a number of distinctive broadleaved deciduous trees. Unique in contrast to their associates and their environment, they are of particular interest. Among such trees is the Oregon white oak *(Quercus Garryana)* which, to those of us who have lived in the eastern part of the United States, is often reminiscent of associations with the much more extensive and interesting oak flora of that area. Like many of our native Northwestern trees, its name is connected with early Northwestern history, for the specific name was given in 1840 in honor of Nicholas Garry, secretary of the Hudson's Bay Company, in return for aid he rendered early botanical explorers in the Pacific Northwest.

Leaves of the Oregon white oak are 4 to 6 inches long and 2 to 4 inches wide, with a lustrous dark green upper surface; the lower surface is pale green and characterized by orange brown pubescence. As with all members of the white oak group, the lobes of the leaves, usually 5 to 7 in number, are rounded. In addition, the margin of the leaves is more or less revolute, or "rolled under." In the spring, at about the time the leaves begin to unfold, the tips of the branchlets are festooned with clusters of slender, pendent catkins—the staminate flowers. Pistillate flowers, found on the same tree, occur singly or in pairs and develop into the familiar acorns which are produced in large numbers, for this tree is a prolific seeder. The acorns are sessile or short-stalked, about 1 to 1¼-inch long, ovoid in general outline, light brown in color, and characterized by a shallow, bowl-like, scaly cup at the base. The scales of the cup are somewhat hairy and their tips are free. On young trees the bark is smooth, but the trunk of old specimens is light gray-brown in color and is broken up into gray scaly ridges which are separated by narrow fissures. Generally, the trunk of the Oregon white oak is short, often crooked, and occasionally divided a short distance from the ground into several subsidiary trunks which support a wide-spreading, round-topped crown. The wood, which is strong, hard, tough, and close-grained, is occasionally used commercially in sections of its range where it is most abundant and where it attains sufficient size.

Although the Oregon white oak occurs from southern British Columbia to the coastal area of central California and grows under a wide variety of soil conditions, it attains its best development on deep, rich loam in areas where the humidity is low during the summer months and where annual rainfall does not exceed 30 inches. Consequently it reaches greatest size and abundance in the intermountain valleys and lower slopes of the Cascades and Siskiyous of southern Oregon and northern California. Here it not unusually attains a diameter of three to four feet and a height of 75 to 80 feet. In Washington, however, this tree is generally much smaller and often scrubby in appearance, although there are, of course, many exceptions. It is commonly seen on the prairies south of Tacoma, and motorists using Highway 99 en route to Portland will note this oak along their route to the Columbia River. It is also found in the San Juan Islands, as well as upon the lower Cascade slopes in the vicinity of Mount Adams where it often occurs in considerable abundance. East of the Cascades it may be found in the Yakima and Columbia River valleys—generally at elevations below 3,500 feet. In its natural environment the Oregon white oak is easy to recognize throughout its range in Washington, for it is the only oak native to our state.

---

*Reprinted, with additions, from "Arb. Bull.," XVI, (2), 7, (Summer 1953).

Mulches—Materials For, and Use in Washington

S. P. Gessel*

A garden mulch can be technically described as a natural or artificial covering applied to the surface of the soil to do a specific job. Mulching did not originate in gardens as mulches occur under all natural undisturbed vegetation covers. A mulch is present in all forest stands in the form of the litter accumulations which gradually form the forest floor or duff layer. These mulch covers are part of the natural cycle and play an integral part in maintenance of proper soil conditions. These forest floors take on particular characteristics related to the vegetation and climate of the area involved and are important in maintaining good growing conditions in the forest. A number of examples have been reported in which complete and continuous removal of this forest mulch and forest litter has had serious consequences to growth and vigor of forest trees. This mulch also enters into the soil cycle and has an important influence on soil properties, particularly some of the physical properties.

The effect of this mulch is probably best described by comparing a soil under a good forest stand and, therefore, with a forest mulch, with an adjacent pastured area. Both of these conditions commonly occur in western Washington and we have had the opportunity to make many such comparisons in connection with the University research work. The forest soil will be more porous, have more organisms and allow water and air to penetrate much more readily.

These general comments should serve to focus attention on the purpose and value of mulches. An expansion of some points will follow and different types of mulches will be enumerated.

Purpose of Mulches

Mulches can contribute to the physical, chemical, and biological environment of plants, probably mainly by modifying the physical, chemical, and biological properties of the soil on which they are placed. Modification of each of these properties will be considered separately.

Physical Effect

Mulches cover the surface of the soil and, therefore, provide insulation against temperature changes. Maximum soil temperatures are reduced and minimums are raised as a result of mulches. The magnitude of the change depends on the type and depth of mulch. This insulating value can be very important in the life of plants if they are likely to suffer from either overheating or from low temperatures. An equally important value is prevention of rapid changes from freezing to thawing during the winter. These changes result in frost heaving damage to many plants in our type of climate when a snow cover is lacking. Mulches can very effectively prevent frost heaving and other rapid soil temperature change effects. All evidence points to the fact that temperature amelioration is one of the important contributions of mulches to northwest gardens.

Conservation of soil moisture and prevention of erosion are equally important values resulting from the use of mulches. A mulch reduces evaporation from the soil surface and makes more of the water available for plant use. The same result comes from prevention of weed growth, by eliminating water loss by transpiration of weeds.

The normal impact of rain or sprinkler applied irrigation water causes spattering of soil particles, resulting in soil losses as well as runoff of applied water. A mulch very effectively reduces or eliminates this effect by absorbing the raindrop impact as well as allowing it to rapidly penetrate the soil. It will also keep plants and fruits free of soil particles resulting from this spattering.

The fact that mulches can prevent growth of undesirable plants has already been alluded to. In this case it serves as a physical barrier

*Associate Professor of Forest Soils, College of Forestry, University of Washington.

to prevent germination and early growth. In some cases it may also have a chemical effect in this regard. This action materially increases water available to desired plants by eliminating transpiration of all weedy growth. This is also an important labor saver in terms of weeds and cultivation problems in our gardens.

Chemical

Although this is not usually the principal reason for putting on mulches, and certainly one does not want to confuse mulches with composts or with high-analysis fertilizers, we should recognize that some of them can have a fertilizer value. The total amount of an element in the mulch may be small, but over a period of time it can contribute to soil fertility. This would of course only apply to those mulches which gradually decompose and thus become incorporated into the soil. The value of the mulch in this respect would depend upon its elemental composition and the ease of decomposition. Leaves of most plants have an adequate chemical composition and decompose rather readily. Therefore, the total mulch effect from one application is temporary but the chemical effect is marked. This type of mulch would have to be renewed frequently in order to serve the physical purposes of mulches.

In some cases a mulch that decomposes may need elemental additions in order to prevent a temporary robbing of elements by bacteria and fungi. This could be true in the case of sawdust or wood chips, and similar high cellulose materials. The element in critical supply is usually nitrogen. Fortunately this can easily be corrected by additions of nitrogen fertilizer, or the high cellulose material can be composted with other organic wastes before using as a mulch.

Some mulching materials could have an adverse affect on plants because of their constituents. This criticism has usually been directed against most coniferous wood chips and sawdust. However, there is no scientific evidence to support the claim of injurious ingredients. Any growth reducing effect is usually due to a temporary nitrogen deficiency in most species. Western red cedar wood does contain a chemical that can suppress growth and it is well not to use fresh cedar sawdust or shavings for mulches.

Biological

A mulch can also be a definite addition to the biological environment of a given area. All the beneficial soil organisms need a food supply in order to live. This is just as true for earthworms as for the many fungi and bacteria working in the soil. A proper mulch may serve as this food supply and result in a great increase in all soil organisms. It is common knowledge that one can find many more earthworms under a mulch of alder leaves or chips than under a hard surface exposed to the sun.

Of course all the organisms living in a mulch may not be good. In some cases it may also be a habitat for slugs, etc., or even parasites. Generally speaking, though, the beneficial organisms associated with mulches far outweigh the harmful ones.

The biological effect is directly related to some of the physical effects. Soil physical improvement results from the activity of many of the soil organisms. These move throughout the soil and improve its structure and porosity. Therefore, if biological activity can be stimulated, soil physical properties are improved.

Mulch Effects

A summary of considerable literature on the use of mulches indicates that when used properly mulches can:

1. Increase growth of plants and yields of fruit, and make more vigorous plants.
2. Insure a more adequate moisture supply for plants, particularly during critical dry periods.
3. Add organic matter to the soil and improve soil physical properties associated with soil aggregation.
4. Promote more rapid infiltration of water, with less runoff and erosion of soil.
5. Add essential elements to the soil as the mulch decomposes.
6. Simplify weed control problems.

Many of these effects are interrelated and all could result from the use of the proper mulch.

Types of Materials

In the Northwest we have a wide choice of materials suitable for mulching to choose from. These range from completely inert material such as sand or gravel, to easily decomposable types. This makes it easy to select the type of mulch best suited to the particular purpose and thus get the best results from mulching.

If a purely physical effect of conserving soil moisture or prevention of weed growth is desired, such materials as sawdust, wood chips, paper of various types, gravel, and plastics are all good. If some of the chemical and biological effects are desired, then one has to be more careful in the selection of appropriate substances. Such items as leaves, wood chips, shredded bark, lawn clippings, hay, spent hops, all have a dual value. These add to the soil as well as producing the purely physical action.

Rather than discuss each type of mulch material separately a table has been provided which lists material available in this area and some comments on possible use.

MULCH MATERIALS

Bark—Becoming more available in the Northwest. Has very good mulching properties and good color.

Hay—Widely used; leguminous hays, such as alfalfa or clover, decay faster than grasses and supply considerable nitrogen.

Hops (spent)—Good, but odor, which persists for a few weeks, may be objectionable; very light color; fire resistance is a great advantage.

Lawn clippings—Satisfactory if used with care; green clippings may heat excessively and mat.

Leafmold (Forest floor)—Adapted for special purposes—small areas.

Leaves—Make better mulch if composted first; some such as maple and poplar tend to mat; oak leaves excellent for rhododendrons.

Manure (strawy)—Provides some nutrients; may burn plants if too fresh.

Peat moss—Fine texture and good color, but has tendency to dry out and then become impervious to water.

Pole peelings—Available in local areas. Is usually in long pieces and not as easy to handle as other materials. However, it does make a good mulch.

Sawdust—Good general mulch; certain kinds are said to have toxic effects, but these reports are not well authenticated; will often cause nitrogen deficiency, which can be corrected by fertilizing with nitrogen. Readily available. Alder and fir both good.

Seaweed—Good; adds mineral elements to soil; not attractive for ornamental plantings.

Straw—Coarser, more durable than most kinds of hay, but lower in elements.

Wood chips, shavings—Useful method of disposing of waste twigs and branches; good mulch, coarser than sawdust, less apt to cause nitrogen deficiency.

Gravel—Can be used for special purposes.

Polyethylene sheets — Makes a very effective moisture seal and also prevents weed growth. Must be tied down.

Paper (various types)—Many paper products are now being manufactured for special mulch use. Old newspaper can also be used.

Mulching Questions

Other natural questions regarding the use of mulches generally are in the category of when to mulch and how much material to use. These questions can only be answered very generally in a discussion of this kind.

The best time to mulch depends a great deal on the type of vegetation and purpose of the mulch. Trees, shrubs and many perennial plants can be mulched permanently and continuously, and normally at planting time. Annual crops, growing from small plants or from seed, cannot be expected to grow through a mulch. Therefore, mulching must come after successful establishment of the plant. Mulching for protection and cleanliness of fruit would be done during the growing season. Mulching for winter protection and for prevention of frost heaving would be done in the autumn. Many other mulches should be applied in the late winter or early spring. This would be the best time for water conservation and weed reduction mulches.

Spring is an ideal time for renewing or applying mulches to trees and shrubs, and fruits such as raspberries and strawberries.

How heavy a mulch to apply depends on the type of crop and the purpose of the mulch, as well as on the type of mulch material used. A mulch for temperature effects normally would require a thicker layer than for other purposes. In some cases

of moisture conservation or weed control, a thin sheet of plastic or impregnated paper has worked very well and is coming into common use in some large scale farming operations. Most plant type mulches should be at least 2 inches thick in order to be effective.

Mulches can also be worked into many special use features in the gardens. Some of the materials form a very attractive covering between plants. Others that may have an objectionable color can be colored artificially to fit into the surroundings and general landscape. For instance, light colored sawdust could be dyed green before placing on the area in question. Special chemicals could also be added to mulch materials for specific purposes such as fertilizer elements or weed preventing chemicals.

It is apparent that mulches and mulching practices can serve a very useful purpose in Northwest gardens. A large supply of materials is available for mulch purposes, particularly of the woody types. Therefore Northwest gardeners should take advantage of this supply and enjoy the benefits of mulching.

Notes on Bamboos

CHAUNCEY E. WIGHT*

Timber bamboo (18 to 35 feet) and golden bamboo (8 to 12 feet) have many effective uses in the garden—as a grove beside a pool or stream; as a silhouette or shadow on a wall; in a series of clumps as a screen; as an interesting form in courts or entrance areas. The foliage of a clump planted just outside a window provides a pleasant sensation of light and movement.

As with so many interesting plants, a little patience plus sensible choice of location is needed to get a good planting of bamboo successfully established. Unless it has been transplanted within the past year or two at the nursery, it takes severe shock on being moved and is likely to lose most of its foliage during the first few weeks. It should be moved with a large root ball (this is not difficult as the soil stays with the root very well) and should be set into loose, friable, fertile soil. Sawdust, or peat ground with manure, can be used to condition the soil. Liquid fertilizer (high in nitrogen) is helpful at time of transplanting as well as later. Plenty of moisture but good drainage for at least a foot of soil depth is required.

Bamboo seems to move best in late spring —April or May.

If you have moved a bamboo plant and it loses much of its foliage, don't give up—the leaves can grow back. But the stalks will not increase in height—they reach mature size in four to six weeks, the timber variety going to as high as thirty-five feet under favorable conditions here.

Secure staking of newly transplanted clumps is one more "must"; until the root is well established they are top-heavy and easily knocked over by a wind.

Bamboo does not freeze here under normal conditions, but suffers from wind exposure. When developed into a grove, it stands the wind much better. In winter, watch for wet snow which can uproot or break the canes by weighting the tops.

These bamboos are evergreen—while the cane does not continue to grow after the first few weeks, the leaves make replacement growth as long as the cane lives. This may be ten years or more.

In May and June, new shoots appear around the old clump, growing a foot a day if the weather is warm. In small clumps, only a few appear. In newly transplanted clumps, any new shoots that do appear may not reach full size. Full growth of new canes requires established roots.

Thinning may be done at any time by sawing off the oldest canes at the base.

(Continued on Page 103)

*Contributed by Mr. Wight following our article on this subject in the Summer (1958) issue.

Arboretum Plant Collections

I MAPLES

This descriptive list is the first of a proposed series which will provide authentic information to show what species, varieties and forms of various genera, important from a horticultural viewpoint, are currently growing in the Arboretum.

The maples happen to be the first chosen, partly for alphabetical reasons (genus ACER), but also because a complete list of them has already been prepared for the new publication, Maples in Cultivation in the United States and Canada, *by the American Association of Botanic Gardens and Arboretums.**

Since it is not possible at present to compile a complete, separate catalogue of all our woody plants, this method is being utilized to publish lists of some of the larger, well established groups over a longer period. We hope it may form a useful record, both now and in the future, of plants growing here.

This list is arranged alphabetically by species, valid names being printed in boldface type, synonyms in italics, and cultivars (forms which have arisen in cultivation and are propagated vegetatively) in capitals within single quotes.

Following the name of the species is that of the botanist (abbreviated) who first gave it this name, with the date of publication; then the native country or region of origin, the source from whence we obtained it, the year, and in what form (seeds, plants, or scions—abbreviated as Sd. Pl., or Sc.). A short note on the tree's chief features is added, an indication of the area in the Arboretum where it is growing, and usually the height of the largest specimen.

Botanical varieties or forms, and cultivars, follow the species in the same arrangement.

Abbreviations for locations in the Arboretum are as follows:

WG. Woodland Garden and the area immediately north of it surrounding the Winter Garden. Most of the large collection of Japanese maples (cultivars of A. palmatum) is to be found here.

WM. An area west of the magnolias, planted from April 1953 with a variety of Asiatic maples.

Bd. Adjacent to and on either side of Lake Washington Boulevard, mainly just south of the junction with Interlaken Boulevard.

MP. Beside the parking area adjoining Madison Street playfield, on both sides of it.

Ny. Plants still in the nursery but well established.

The letters U.S.D.A. refer to the U. S. Department of Agriculture, Bureau of Plant Introduction, or Plant Introduction Station, at Beltsville or Glenn Dale, Md.

Acer barbinerve Maxim. (1867) S.E. Manchuria
Arnold Arboretum, Boston, Mass. (1952) (Pl.)
An attractive, hardy, fast growing member of the small Section ARGUTA, regrettably rare in cultivation. Ht. 9 ft. WM

A. Buergerianum Miquel (1866) Japan
(*A. trifidum* Hook. & Arn., non Thunb.)
Trident maple
K. Wada Nsy., Numazushi, Japan (1940) (Pl.)
Exp. Forest Stn., Kyoto Univ., Japan (1955) (Sd.)
A promising 30-40 ft. tree for this region, but as yet little known. Leaves noticeably 3-pointed, whence the common name. Some trees show orange to red fall leaf color. Ht. 16 ft. Bd.

var. **ningpoense** (Hance) Rehder (1905) E. China
Stanford Univ., Palo Alto, Calif., (1947), (Sd.) Bd.

A. campestre L. (1753) Europe; W. Asia
Hedge or field maple. Source unknown.
Mature plants of this rather dull small tree are growing near the pond west of the Boulevard, south of Interlaken. They show no fall color and have little value in flower, but tolerate city conditions well. Ht. 30-40 ft. Bd.

var. **austriacum** 'COMPACTUM'
Kingsville Nsy., Md., (1952) (Pl.)
A bush form. Bd.

A. capillipes Maxim. (1867) Japan
Westonbirt Arb., Tetbury, England (1947), (Sd.)
An ornamental small tree with striped bark similar and related to A. rufinerve, the leaves long pointed and sharply lobed, 4-5 ins. long and almost as wide, their stalks reddish. Fall color orange-red. Ht. 21 ft. WG

A. cappadocicum Gleditsch (1785) S. Russia to Himalaya
(*A. laetum* C. A. Mey. (1831))
Highland Park, Rochester, N. Y. (1955), (Pl.)
A large tree (to 60 ft.) related to the Norway maple and like it, coloring yellow in fall. Ny.

forma rubrum (Kirch.) Rehd. (1922)
Hagen Nsy., Arcadia, Cal., 1953, (Pl.)
Young foliage deep red. Found wild with the type in S. Russia. WG

A. carpinifolium Sieb. & Zucc. (1845) Japan
Hornbeam maple
U.S.D.A. (P. I. 95540), (1938), (Pl.)
Imp. Univ. Bot. Gdn., Tokyo (1953), (Sd.)
A most distinct and rare small tree; the leaves are undivided, 3-4 ins. long, closely resembling those of a hornbeam (Carpinus). Fall color orange to brown. (a) At N. Broadmoor gate. (b) Ny. Ht. of (a), 6 ft.

A. circinatum Pursh (1814) B.C. to California
Vine maple. Native in Arboretum.
Fall color red in sunny locations, pale or yellowish in shade.

*Available from the Arboretum office. Price, $2.00.

'ELEGANT.' A selected form named at and obtained from the Dominion Arboretum, Ottawa. Ny.

A. circumlobatum Maxim. See A. japonicum var. circumlobatum.

A. cissifolium (Sieb. & Zucc.) K. Koch (1864) Japan
Nikko Bot. Gdn., Nikko, Japan (1949), (Sd.)
One of the small NEGUNDO Section with trifoliate leaves; an attractive specimen tree up to about 30 ft. First flowered May 1958. Can be propagated by summer cuttings. An earlier introduction from the U.S.D.A. (1937, Pl.), failed to establish. Ht. (two trees) 12 ft., 13½ ft. WM

A. crataegifolium Sieb. & Zucc. (1846) Japan
Hawthorn maple
Prob. U.S.D.A., (P. I. 102290) as A. micranthum (1937), (Pl.)
Kyoto Univ. Exp. Forest Stn., Kyoto, Japan, (1954) (Sd.)
A promising small tree related to the Chinese A. laxiflorum, with long pointed, lobed and toothed leaves. (a) WG; (b) Ny.

A. dasycarpum Ehrh. See A. saccharinum

A. Davidii Franch. (1886) Widespread in China
David's maple
Garden in Berkeley, Cal., 1947, (Sd.)
A most distinct and pleasing small tree, of spreading, arching habit, the bark markedly streaked with white lines. Leaves ovate, 4-5 ins. long, deeply veined, not lobed; fls. green, inconspicuous, April or early May. Named for Father Armand David (1826-1900) French missionary, naturalist and zoologist in W. & C. China. Ht. of largest tree (WG) 20 ft.; of smaller (WM), 12½ and 13½ ft. WG; WM

A. diabolicum Blume ex K. Koch (1864) Japan
U.S.D.A. (P. I. 102289), (1937), (Pl.)
One of a section of maples, LITHOCARPA, with 5-lobed, coarsely toothed leaves and a markedly keeled or crested fruit. It has no particular ornamental value, though the leaves are rather large, shining on the underside.

A. dissectum Thunb. See A. palmatum var. dissectum

A. erianthum Schwerin (1901) C. & W. China
Roy. Bot. Bdn., Edinburgh, Scotland, (1949), (Sd.)
Very slow in growth, our single small plant has not yet been planted out. A relative of the mountain maple, A. spicatum, and given a good report in England by W. J. Bean, especially for its flowering qualities. Ny.

A. ginnala Maxim. (1856) China; N.E. Asia; Japan
U.S.D.A., Beltsville, Md. (1945), (1949), (Sd.)
W. J. Marchant, Wimborne, England (1947) (Sd.)
Often a large shrub. Grown for red fall leaf color, but no outstanding individuals here in that respect. Needs ample sunshine. MP; Az. Way

A. glabrum Torr. (1828) S.E. Alaska; W. Canada; N.W. U.S.A.
var. **Douglasii** (Hook.) Dipp. (1892)
Mountain maple. Douglas' maple.
Coll, nr. Ellensburg, Wash. (1950), (Sd.)
Upright and graceful in habit, this small 15-20 ft. tree of mountain slopes is well worthy of cultivation and grows quickly. Viable seed is often hard to find. Bd.

A. griseum (Franch.) Pax (1902) W. China
Paperbark maple
Sir F. C. Stern, Sussex, England, (1947), (Sd.)
Nat. Arb., Washington, D.C., (1953), (Pl.)
One of the most distinctive and beautiful species of the whole race, with small, trifoliate, softly hairy leaves turning rose or red in fall, the thin bark peeling off to reveal the smooth brown stem. Unfortunately still very scarce owing to difficulty of propagation. Closely related to A. nikoense, but more compact and attractive in habit. Ht. (of four trees, both introductions), 8 ft. WM

A. Grosseri Pax (1902) W. & C. China
Westonbirt Arb., Tetbury, England, (1947), (Sd.)
Sir F. C. Stern, Sussex, England, (1947), (Sd.)
G. H. Johnston, Cornwall, England, (1954), (Sd.)
First received under Forrest's No. F. 21337; second as A. Forrestii, but identified at Arnold Arb., Jan. 1955.
A member of Section MACRANTHA, all valuable small trees, this species is related to A. Davidii and the Japanese A. rufinerve, which it more resembles in its lobed foliage. The young shoots are bright red, later purplish, the growth vigorous, habit spreading. One tree reached 12 feet by 9/54; another flowered May 1954. It is less hardy than any of its relatives here, though not damaged until Nov. 1955, but then killed to the ground. Ht. now (of 1st introduction) 7½ ft. WG; WM
var. **Hersii** (Rehd.) Rehd. (1933) E. C. China
(*A. Hersii* Rehd. (1922))
Hillier & Son, Winchester, England, (1948) (Sd.)
Differs from the type species in the lack of red coloring in the bark, the shape and angle of the leaf lobes, and in its greater hardiness, being unhurt by the cold of Nov. 1955. Our single plant, 8½ feet tall by Aug. 1955, is now 12½ ft. WM

A. Hersii Rehd. See A. Grosseri var. Hersii

A. ibericum Bieb. See A. monspessulanum f. ibericum

A. japonicum Thunb. (1784) Japan; Korea; Manchuria
K. Wada Nsy., Numazushi, Japan, (1940), (Pl.)
Because of its slower, more upright growth, and larger, more handsome foliage, this close relative of the native Vine maple has greater value for smaller gardens. Fall color is similar, from orange to red depending on soil and location. WG
var. **circumlobatum** (Maxim.) Koidz. (1911)
(*A. circumlobatum* Maxim. (1867))
K. Wada, Japan, (1940) (Pl.)
Leaves smaller but petioles much longer than in type. WG

A. laetum C. A. Meyer. See A. cappadocicum

A. leucoderme Small (1895) S.E. U.S.A.
White-barked sugar maple
F. M. Crayton, Biltmore, N.C., (1944), (Pl.)
Slow in growth, but not in a very favorable situation. Ht. 8 ft. WM

(Continued on Page 98)

The Arboretum Bulletin

VOL. XXI, NO. 3 SEATTLE, WASH. FALL, 1958

ARBORETUM FOUNDATION
OFFICE HOURS
9 a. m. to 4:30 p. m.
Monday through Friday
Phone EAst 5-4510

ARBORETUM FOUNDATION OFFICERS

EDWARD B. DUNN, *President*
DR. WALTER A. MOORE, *Vice-President*
PHILIP W. BAILEY, *Vice-President*
MRS. PAGE H. BALLARD, *Vice-President*
ROSCOE DRUMMOND, *Treasurer*
MRS. W. KIRBY HOLMES, *Secretary*
MISS GENE WEBB, *Executive Secretary*

BULLETIN EDITORIAL BOARD

BRIAN O. MULLIGAN, *Editor*

Mrs. Page Ballard
Mrs. James Buzard
Mrs. J. Thos. Dowling
Dr. A. R. Kruckeberg
Mrs. Beth G. Malmo
Mrs. L. N. Roberson
Mrs. O. B. Thorgrimson

Special Notice

To keep memberships in the Arboretum Foundation in good standing, dues should be paid during the month payable. Active memberships more than three months in arrears will be dropped and THE BULLETIN will be discontinued.

Arboretum Membership Blank

☐ Active	$ 5.00
☐ Contributing	10.00
☐ Supporting	25.00
☐ Sustaining	50.00
☐ Sponsor	100.00
☐ Life	500.00
☐ Endowment	1,000.00
☐ Affiliated Garden Clubs and other organizations	10.00

The Arboretum Foundation,
University of Washington Arboretum
Seattle 5, Washington

I hereby apply for membership in the Arboretum Foundation and remittance for same is enclosed to cover dues for the next succeeding 12 months.

Name .....

Address .....

All memberships are non-assessable.

The Arboretum Presents . . .

An Expanded Education Program

IT was in December, 1957, that the Board of Directors of the Arboretum Foundation authorized the formation of a committee whose major concern was to assist the Arboretum in expanding the influence of its educational advantages. Mr. Mulligan, the Arboretum Director, had suggested that we send his assistant, Mr. Witt, to Morton Arboretum to study their fine education program. Mr. Witt spent several very profitable days at the Lisle, Illinois, Arboretum, in February, and came home to give us a stimulating report of the many facets of that outstanding community contribution.

In the meantime our Education Committee was planning an interim program to take place while we were experimenting and setting up a more permanent plan. This committee is composed of representatives from the Arboretum staff, the Unit Council, the University of Washington Botany Department, the Foundation, and, in an advisory capacity, the Director of the Arboretum and the President of the Foundation.

For many years the Unit Council has sponsored study courses, lectures, and horticultural exhibits for unit members. Last year these were opened to non-members and the response was so overwhelming that the Council could no longer carry the responsibility alone. Then, too, there was a growing realization of the need for showing Northwest gardeners how to use the Arboretum to extend their knowledge and horticultural techniques.

The interim program was made up of two series and the first, on "Planning . . ." and "Planting the New Lot" was well attended. Reports on each of these sessions were published in the Summer, 1958, issue of the Arboretum Bulletin.

The second series was presented with the co-operation of the University of Washington Botany Department. Dr. Walker and Dr. Kruckeberg aroused so much interest

in "Botany for Gardeners" that each class went far beyond the two hours originally planned. At each of the four sessions these two able instructors, with generous patience, answered questions far into the night. There have been so many requests for "more of the same" that we are hoping to offer their eager students a 12-week course soon.

A workshop on *"Propagation of Woody Plants"* is now in session. Mr. Michaud (of the Arboretum staff) has two classes of ardent propagators learning how and when to take a cutting, and what to do with it when it has been severed from the parent plant. Space is limited, so until we can have a greenhouse especially for class use (and it could also be used for the propagating of plant material for the Unit Council's Plant Sale) we will not be able to accept more than the fraction of the requests for these classes.

The Arboretum staff has long felt that the training of youth leaders should be part of the Arboretum program. Our initial effort in this area was a Girl Scout Leadership Training course in "Tree Identification" and "Native Plants." This four-session course was held in April and May, 1958, with Mrs. Ballard and Mr. Witt as instructors and four Arboretum Foundation members acting as guides and assisting the Scouts' training committee. Two courses have been planned for the coming year: one on "Trees" in October, 1958, and another on "Native Plants" in the Spring of 1959.

The Arboretum Presents, on the second Monday of each month, will be held in the Clubhouse. This is not a lecture series, but rather an informal meeting offering an opportunity for gardeners to take part in interviewing Arboretum staff members, horticultural experts, visitors from other arboreta and botanical gardens and successful amateur growers.

The Natural History of the Pacific Northwest will feature professors from the U. of W. Botany, Zoology, Geology, and Forestry Departments, and the Director of the Arboretum. Rock formations and the resultant plant growth; the garden use of native trees, shrubs, and plants; and the birds and animals of the region will be covered in this series. Tentative dates are October 21, February 17, and April 14. More definite information may be obtained from the Foundation office.

Andromedas to Zenobias—a Survey of the Heath Family—is scheduled for January 27, February 2, 10, 17 and 24, 1959, in the Clubhouse. Unit 60, whose members have been studying the ERICACEAE at weekly meetings for more than five years, is sponsoring this course. These classes will deal with the History, Distribution and Botanical Aspects of the Heath Family; Outstanding Genera; Species Rhododendrons; Propagation; and Sources for Plants and Seeds. They will be illustrated with colored slides of plant material growing in the Arboretum and in the gardens of members of the group.

Mr. Witt, Assistant Director, will conduct a course on *Ornamental Trees and Shrubs for Northwest Gardens* on each Tuesday evening in March, April and May. The last two meetings will be devoted to Arboretum field trips.

These are only a few of the educational advantages being offered by the Arboretum during the coming year. The Unit Council is continuing its study courses, lectures, and other events and there will also be demonstrations in pruning, various methods of propagation, and short courses offered from time to time. Informational bulletins are being prepared for distribution. If you want to be informed as to just what the Arboretum has to offer, and when and where it will take place, have your name placed on the Education Program Mailing List by calling EAst 5-4510, or by writing to The Arboretum Foundation, c/o the University of Washington Arboretum, Seattle 5.

Hear Ye!

Hear Ye!

The 1958 Town and Country Garden Tour Committee "bows and scrapes" with gratitude to the garden owners who so generously presented their beautiful gardens—and to the many willing gals who so ably conducted the tours.

We've done well . . . and all credit with great appreciation goes to YOU for making this first series of Garden Tours the greatest financial and goodwill endeavor the Arboretum Foundation has ever sponsored.

With blood, sweat and tears,

THE 1958 GARDEN TOUR COMMITTEE

Arboretum Plant Collections
I MAPLES

(Continued from Page 95)

A. macrophyllum Pursh (1814) B. C. to Calif.
Native in Arboretum

Oregon maple

First collected by A. Menzies on Olympic Peninsula, Wash., May 1792. Too large and vigorous for small gardens, producing heavy crops of seedlings in cultivated areas. Some individuals have rich orange-yellow fall leaf color.

'SEATTLE SENTINEL' Seattle, Wash.
From original tree, (1952) (Sc.)
A fastigiate form growing on 18th Ave. near Madison St. in Seattle. Described in "Arb. Bull.," XVII, (4), 112, Fig. 18, (Winter 1954). Ny.

A. Maximowiczii Pax (1889) N.W. China
Morton Arb., Lisle, Ill., (1955), (Sc.)
Very rare in cultivation, but judging by descriptions, an illustration, and relationships (in Section MACRANTHA, near A. Forrestii and A. Tschonoskii) it should be worth a trial here and entirely hardy. Ny.

A. micranthum Sieb. & Zucc. (1845) Japan
K. Wada, Numazushi, Japan, (1940), (Pl.)
A graceful, slender branched small tree with 5-lobed serrated leaves; the flowers are very small, in short racemes. Fall color orange or near it. Closely related and very similar to A. Tschonoskii. Ht. 9 ft. WM

A. Miyabei Maxim. (1888) N. Japan
Miyabe's maple
Arnold Arb., Boston, (1949), (Sd.)
U.S.D.A., Beltsville, Md., (1949), (Sd.)
A near relative of the European Norway maple (A. platanoides), but too young yet to show its capabilities here. WG; N. Bd.

A. Mono Maxim. (1857)
China; Manchuria; Korea
(*A. pictum* Thunb. (1784))
K. Wada, Numazushi, Japan, (1940), (Pl.)
Arnold Arb., Boston, (1949), (Sd.)
A larger tree (to 60 ft.) than the last, but like it belonging to Section PLATANOIDEA. Fall color of both is yellow. One tree possibly from earlier introduction. Ny.

A. monspessulanum L. (1753)
E. France to W. Asia; N. Africa
Montpellier maple
From garden on Union St., Seattle, (1956), (Pl.)
An excellent, round headed, hardy small tree for the Puget Sound region, as demonstrated by the avenue on Queen Anne Hill, Seattle. A sunny, well drained site is recommended. Ht. 10 ft. Bd.

f. **ibericum** Koch (1869) W. Asia
(*A. ibericum* Bieb. (1808))
Bot. Gdn., Erevan, Armenia, U.S.S.R., (1945), (Sd.)
Said to differ slightly in foliage characters from the type. Bd.

A. Negundo L. (1753) S. Canada and U.S.A.
Box Elder
Duke University, Durham, N. C., (1937), (Sd.)
Very widespread in its distribution across the U. S., and tolerant of both drought and cold, but brittle and lacking many ornamental qualities. Ht. only 13 ft., due to breakage by vandals. Bd.

'VARIEGATUM'
Wayne Nsy., Bothell, Wash., (1957), (Pl.)
A decorative tree reaching about 30 ft. in height. Originated in Toulouse, France, 1845. Bd.

A. nigrum Mich. f. (1812)
S. Canada and E. U.S.A.
(*A. saccharum* var. *nigrum* Britt.)
Huntington Coll. Bot. Gdn., Indiana, (1948), (Pl.) Black Maple.
Closely related to the sugar maple, but the leaves softly hairy beneath, drooping at the sides, and apparently less brilliant in fall coloring. Ht. 12½ ft.

A. nikoense Maxim. (1867) C. China; Japan
Nikko maple
K. Wada, Numazushi, Japan, (1940), (Pl.)
Like its near relatives with trifoliate leaves, A. griseum and A. mandshuricum, this rather slow growing tree is noted for its fall leaf color, usually a soft rose red. Because of its scarcity and the lack of a plentiful seed supply, it will probably be many years before a quantity of young plants is available. Ht. (of two trees) 12½ ft., 19 ft. WG

A. oblongum Wall ex D. C. (1824)
W. Himalaya to C. China
Peking-Kunming Nurseries, Shanghai, China, (1948), (Sd.)
The only member of the evergreen section INTEGRIFOLIA which has been grown here. Planted out in June 1951, frozen to the ground in November 1955 and now only 5 feet tall, it cannot be recommended for this climate, but is very distinct and different from all other species grown here. The tough leaves are entire, prominently veined, waxy white beneath, up to 5 ins. long.
var. **biauritum** W. W. Sm. (1915) S.W. China
(*A. Paxii* Fr. (1887))
E. L. Egger Nsy., Mill Valley, Cal., (1954), (Pl.)
Likewise barely hardy with us. WM

A. Oliverianum Pax (1889) China
Lushan Bot. Gdn., Kuling, China, (1949), (Sd.)
Although the 5-lobed, long-stalked foliage somewhat resembles that of A. palmatum, the relationships of this ornamental small tree are with members of section SPICATA, especially A. sinense, and more distantly to the Sycamore maple (A. Pseudo-platanus) and our native Oregon maple. Growth has been rather slow, but the situation is not the most favorable. Ht. (of two trees) 8½ ft. WM

A. palmatum Thunb. (1783) Japan; E. China
Japanese maple
Collections imported 1940 and 1941 from K. Wada, Japan, (Pl.)
A polymorphous species from which numerous variations have been selected and propagated in Japan. They vary in height and habit, but especially in leaf shape, size and color, including fall coloring. It has only been possible to check the authenticity of our names in a few instances and more work on the identification of these charming and valuable plants is needed. Four principal varieties have been distinguished:

(a) var. **dissectum** (Thunb.) Miq. (1867)
(*A. dissectum* Thunb. (1784))
Leaves divided to the base into 5-9 sharply and deeply cut lobes.
Includes the following forms or clones:
'Flavescens'; 'Matsukaze'; 'Nana-segawa'; 'Omuroyama'; 'Ornatum'
(*A. ornatum* Carr.) WG
forma sessilifolium (Sieb. & Zucc.) Rehd. (1949)
The Japanese name is 'Hagoromo-kaede'.

(b) var. **heptalobum** (Rehd. (1938))
(var. *septemlobum* K. Koch (1864))
Leaves larger than in type (3-3½ ins. long), usually 7-lobed, the finely serrated, acuminate lobes widest about middle.
Includes the following:
'Lutescens'; 'Naruo-nishiki'; 'Ogonsarasa'; 'Omato'; 'Ohsakazuki' Bd.; WG

(c) var. **linearilobum** Miq. (1867)
Leaves divided into 5-7 very narrow, entire lobes. We have only 'Atrolineare', with dark red leaves. WG

(d) var. **palmatum** (K. Koch) Rehd. (1938)
Leaves 5-, or 7-9-lobed, 2-2½ ins. long, deeply divided, the lobes lanceolate-oblong, serrate.
Includes: 'Atropurpureum'; 'Uchiwanagashi'; 'Versicolor'. Bd.; WG

The following clones have not been assigned to any of the preceding varieties:
'Aocha-nishiki'; 'Argenteo-marginatum'; 'Asahi-zuru'; 'Asaji'; 'Azuma-Murasaki'; 'Butterfly'; 'Chikushigata'; 'Harusame'; 'Hatsushigure'; 'Hogyoku'; 'Miyagino'; 'Ohshoibani'; 'Okushimo'; 'Pendulum nigrum'; 'Purpureum'; 'Reticulatum'; 'Sangokaku' (*'Senkaki'; 'Corallinum'*); 'Shikageorinishiki'; Shishigashira'; 'Tsukubane'; 'Tsumebeni'; 'Wounishiki'; 'Yugure'.
Most of these trees now exceed 8 ft. in height, excepting the naturally low forms, as var. dissectum 'Ornatum'. Among the largest are:
'Harusame' (15 ft.); 'Hogyoku' (14 ft.); 'Matsukaze' (16 ft.); 'Sangokaku' (13½ ft.); 'Tanabata' (12½ ft.); 'Tsukubane' (17½ ft.); 'Tsumebeni' (13½ ft.); and 'Wounishiki' (18 ft.).

A. Paxii Fr. (1887) See A. oblongum var.

A. pensylvanicum L. (1753)
S. E. Canada; E. U.S.A.
Moosewood
F. M. Crayton Nsy., Biltmore, N. C., (1944) (Pl.)
Notable, like several of its Asiatic relatives, especially A. tegmentosum, for the white striped bark of young trees. Leaves are large and somewhat coarse, turning yellowish in fall. Prefers partial shade. Ht. 8 ft. WM
'ERYTHROCLADUM' (Spath) Rehd. (1949)
Arnold Arb., Boston, (1955) (Sc.)
Young twigs red. Origin in Germany prior to 1904. WG

To Be Continued in Winter 1958 Issue

"Maples Cultivated in the United States and Canada"

by BRIAN O. MULLIGAN, *Director*
University of Washington Arboretum
SEATTLE, WASHINGTON

List with data regarding geographical distribution, classification, arboretum plantings, propagation, etc.
American Association of Botanical Gardens and Arboretums

Copies may be obtained at $2.00 each from

CARL W. FENNINGER, Secretary
P.O. Box 216, Lima
Delaware County, Pa.

ARBORETUM NOTEBOOK

This section is particularly designed for notes, information and queries concerning beautiful or unusual plants from growers of all types or experience. We solicit your remarks and ideas, but space limitations may sometimes restrict us to publishing those of the widest interest.

Garden Hints . . .

OCTOBER

"If he had a hobby-horse, it was this.
He loved a garden!" JANE AUSTEN

October is the chosen month for planting flowering shrubs. Then it is quite possible they will flower on time in their respective seasons.

Nearly every plant or shrub develops a bud immediately above each leaf and, if left, this bud (a potential branch or flower) will develop into branches that will make a tangle or mass of branches. The food in the soil cannot nourish the many growths produced. Fine blooms cannot develop. The gardener has the privilege of periodically cutting back his shrubs or plants so they may produce better flowers on fewer growths.

Most shrubs—except the early bloomers—may be pruned now. Many neglected shrubs may be rejuvenated. Dead and weak wood should be removed and then the shrub may be shaped by cutting back old wood to strong new growth. New buds may be stimulated by forking the soil around the base of the shrub and adding compost or new soil.

Rosa rugosa makes an interesting, informal and unusual hedge, There are variously colored varieties—white, pink and crimson, — and the bright scarlet heps give a second season of beauty.

A somewhat large grouping of bamboos makes an especially interesting background for ferns in a woodland garden.

Recently I have been reading a description of a journey to Corsica by Will Ingwersen, the well known English horticulturist. He describes the "ubiquitous" Corsican hellebore with great excitement and his enthusiasm can easily be understood after seeing the beauty and growth of this plant during the last year here in our own country.

Lilium candidum is one of my favorites. This capricious Madonna Lily may often be seen growing beautifully in a neglected garden but it may fail entirely with care and attention. Generally it seems to prefer a limy soil and shallow planting and sometimes will grow in full sun. It seldom—if ever—sets seed so must be increased by division. The west coast lily growers have developed a new strain that makes it one of the most beautiful of all lilies. Mr. deGraaff lists a *L. candidum* "Spice" as one of the best of his candidum crosses. The original species has been known and grown for centuries. The bulbs should be planted in mid-summer (August). The leaves appear in a very short time but are not sensitive to winter weather.

Lily seeds may still be planted in rows in empty spaces in the garden, in boxes, flats or pots. A good compost to use is a mixture of old leaf-mold, peat and sand firmed well with ¼ inch of sand on top in which to sow the seeds. Some seeds germinate in a few days but some linger along for weeks or months. Keep the shoots well protected from slugs.

NOVEMBER

"Autumn wins you best by this, its mute
appeal for sympathy for its decay."
ROBERT BROWNING

It is wise to know your soil and then pick the plant or shrub for the life it is expected to lead. Many of us try to make our gardens beautiful with plants that hate and despise the spot where they are expected to grow. There are many beautiful plants that like light thin soil, such as heathers and dwarf brooms, while Asiatic primroses, many irises and shrubs prefer heavy, damp soils.

Crocus Tomasinianus is one of the most beautiful of all species of crocus. Its blossoms appear in February and it keeps blossoming until April. The blooms are the shape of a slender-stemmed wine glass. I started with a dozen bulbs and in a few years there were hundreds. We always looked for "Tom" before spring came and every one had a new description of its color. There are many botanical differences between a crocus and

a colchicum. An easy way to distinguish them is to count their stamens. The crocus has three stamens and the colchicum six. The crocus belongs to the Iris family, while the colchicums are classed among the lilies.

I had a shrub in my garden that I admired very much but seldom see today. It is called Neillia and is a close relative of the spireas. It has long arching branches, six to eight feet long at its best, and bright pink racemes of flowers for several weeks. It needs occasional cultivation and removal of twiggy growths. I grew it at the sunny edge of the woods in a damp spot.

Magnolia salicifolia, the Willow-leaved magnolia, is suitable for small gardens. It begins to bloom when it is only three to four feet tall. The small leaves and its pyramidal manner of growth make it valuable for a limited space. In April the branches may be decorated with many delicately-scented white blossoms.

DECEMBER

"More grows in the garden than the gardener has sown."

Last year in December I was given a potted blooming plant of *Helleborus niger.* Its pinkish blossoms fascinated me as I had never seen it used as a house plant. I had always thought hellebores hated to be disturbed or divided. I learned that choosing the time of lifting is the one important, hard and fast rule when potting them. When the buds first appear deep in the heart of the plant, generally in late October or early November, the plant may be lifted and potted in a rich, heavy soil enriched with peat and rotted leaf-mold. Remembering it is a winter-blooming plant, it must be kept in a sunless spot until it is in bloom. Then it may be brought into the house where it may bloom for six weeks. When it is through blooming it may be planted again in the garden.

Galax aphylla makes a gallant show in fall and winter. It grows a cluster of glossy, leathery, heart-shaped leaves. In late fall and as cold weather approaches, the leaves turn bronzy and often a brilliant red. It likes a shady spot where, in the spring, it throws up pure white spires of bloom which give it the familiar name of Wand Flower.

FALL PROPAGATING NOTES

Fall weather gives added impetus to the interest in propagating plants. Cooler nights give warning that tubbed plants of questionable hardiness should be moved to winter quarters, whether that be in a greenhouse, or buried in the ground as is often done with fuchsias, or simply in the recreation room or living room for winter enjoyment, as is frequently practiced with *Hibiscus rosa-sinensis* and *Tibouchina semidecandra. Cyperus Papyrus* (Umbrella Plant) should be removed from outdoor pools in northern states. It may be handled as a house plant during the winter and, in such a case, does not require true aquatic conditions.

Fall is a suitable time to check air layerings made in the spring on such plants as magnolias, maples, rhododendrons and viburnums. If seedlings of understock, such as *Rhododendron ponticum,* have been grown in expectation of doing some grafting in January, they should be potted in the fall so that all is in readiness.

A simple expedient for increasing *Daphne Cneorum* is to hill up soil around the crown in the autumn. Divisions should be ready the following season. More often branches are pegged down, or layered, and later severed to start new plants. *Juniperus horizontalis* 'Plumosa' and similar plants may be layered along the branches, which are then cut in sections when rooted. Innumerable plants respond to one or another of these methods of propagating.

Ground covers assume an important role in modern landscaping design. Each one is usually required in a large quantity. It is not too late in September or October to make cuttings of *Andromeda Polifolia, Arctostaphylos, Uva-ursi, Ceanothus gloriosus, Cotoneaster Dammeri (humifusa), Gaultheria Miqueliana, Helianthemum nummularium, Luecothoe Davisiae, Pachysandra terminalis, Pernettya mucronata, Sarcococca Hookeriana, Vaccinium Vitis-idaea* (Lingenberry), and

Vinca minor (Periwinkle).

Cuttings of hedge plants such as *Buxus sempervirens, Ligustrum japonicum,* and *Lonicera tatarica* root well and easily when taken in the fall.

Clematis Armandii may be cut in September or October if the wood is not too ripe. Cut half-way between nodes. Roots form at the cut rather than at the node.

It is risky to let October pass without making cuttings of any tender plants of which stock is wanted. Geraniums, petunias of unusual types, fuchsias, *Coleus Blumei, Heliotropium spathulatum, Impatiens Sultanii* and the double type of *Tropaeolum* (Nasturtium) are possibilities.

October is a good month to propagate Azara, Calycanthus, Cornus, Escallonia, Eucryphia, Magnolia, Pieris and Stranvaesia and to continue making cuttings of Elaeagnus and Euonymus as well as many types of Azalea. *Camellia Sasanqua* cuttings usually respond well when made in November. Ilex and Philadelphus are also ready then.

Species mentioned are only representative of the many more similar plants which may be handled in the autumn season.

JAMES A. BUZARD
FRANCES KINNE ROBERSON

List of Plant Names

(Continued from Spring, 1957)

Vallisneria	for Prof. Antonio Vallisnieri
Vallota	for Pierre Vallot, French botanist
Vancouveria	for Capt. George Vancouver
Vanda	native name in India
Vandopsis	like Vanda
Vanhouttei	for Louis van Houtte, Belgian nurseryman
Vanilla	Spanish, little sheath
variabilis	variable
varicosus	varicose
variegatus	variegated
variifolius	variable leaved
variiformis	of variable forms
varius	various, diverse
Vaseyi	for G. S. Vasey
vegetus	vigorous
Veitchia	for James Veitch, Jr.
Veitchianum	for the family of nurserymen
Veltheimia	for Count von Veltheim
vellereum	fleecy
velutinus	velvety
velox	rapid, swift
venenatus	poisonous
venator	hunter, in allusion to scarlet flowers
Venidium	perhaps from Lat. vena, vein, referring to seeds
venosus	veiny
ventricosus	inflated, swollen
venustus	lovely, charming
Veratrum	ancient Latin name; lit. truly black
verbascifolius	verbascum leaved
Verbascum	old Lat. name of mullein
Verbena	ancient name of European vervain
Verbesina	adaptation of verbena
verecundus	modest, shy
vermiculatus	worm-like
vernalis	of spring
vernicifera	varnish bearing
vernicosus	varnished
Vernonia	for William Vernon, botanist
vernus	of spring
Veronica	for St. Veronica
verrucosus	warted
verruculosus	covered with small warts
Verschaffeltia	for Ambrose Verschaffelt, Belgian author
vexillarius	of the standard petal (in Leguminous plants)
Vialii	for Pere Paul Vial, missionary in W. China
viburnifolius	viburnum leaved
Viburnum	ancient Lat. name
Vicia	classical Lat. name
viciifolius	vetch leaved
Victoria	for Queen Victoria
victorialis	victorious
Vigna	for Dominico Vigna, professor of botany
Viguiera	for Dr. A. Viguier, botanical author
Villaresia	for Matthias Villarez
villosus	villous, shaggy
viminalis	with long flexible shoots
Vinca	old Lat. name of periwinkle
Vincetoxicum	Lat. compound, to conquer poison
vinifera	wine bearing
vinosus	full of wine
Viola	classical name
violaceus	violet
violascens	becoming violet colored
virens	green
virescens	becoming green
virgatus	twiggy, willowy twigs
Virgilia	for the poet Virgil
virginalis	virgin, maidenly
virginianus	of Virginia
viridescens	becoming green
viridiflorus	green flowered
viridifolius	green leaved
viridis	green
viridissimus	very green
viridulus	greenish
viscidulus	somewhat sticky
viscidus	viscid, sticky
viscosissimus	very sticky
viscosus	sticky
vitaceus	vitis-like
vitellinus	egg yolk yellow
Vitex	ancient Lat. name
viticulosus	of the habit of the grape vine
vitifolius	grape leaved
Vitis	classical Lat. name for grape vine

Vittadinia	for Dr. C. Vittadini, Italian author
vittatus	striped
viviparus	producing asexual propagating parts
volgaricus	of the Volga River
volubilis	twining
volutus	rolled together
vomitorius	emetic
Vriesia	for Dr. W. deVriese, Dutch botanist
vulcanicus	of or on a volcano
vulgaris	common
vulpinus	of the fox

The Oaks at Hoyt Arboretum

(Continued from Page 83)

the present time includes the largest trees in our collection. Our shingle oaks *(Q. imbricaria)* are also doing well and show promise of easy growth in this area. The latter were somewhat decimated by mice during the past winter; some of the trees gnawed by these rodents were four inches at the base. Use of a government poison put an end to their depredations and probably saved our other oaks from a like fate.

Other oaks established at the Hoyt Arboretum include the tanbark oak, willow oak, black oak, scarlet oak, red oak, English oak, white oak, Pacific Post oak, overcup oak, burr oak, swamp white oak, chestnut oak and Kellogg oak.

Notes on Bamboos

(Continued from Page 93)

Newer canes are a deeper green and are easily distinguished from the old. A bamboo properly thinned is of much better appearance than one which has not been thinned, with better foliage, cane growth, and generally better effect.

Be careful about planting bamboo next to a paved walk or drive, as the root system can raise the pavement and cause cracks to appear. If new shoots start up in areas where they are not wanted, they can be transplanted or cut off.

Insects and disease seem to give bamboo little or no trouble, so, in brief, the keys to success with this plant are: rich soil, moisture, drainage, and protection from wind.

Bunge Lumber & Hardware Co.

High Grade Peat Moss and All Types of Fertilizer

Including

Acid Fertilizer for Rhododendrons, Azaleas, Camellias, etc.

WEst 2-0022 — 9616 16th Avenue S.W., Seattle 6

For GIFTS and FLOWERS

of Unmistakable Distinction

Crissey FLOWERS · GIFTS

1329 Fifth Avenue — **MAin 2-1100**

BOOK REVIEWS

The Art of Flower and Foliage Arrangement, by Anna Hong Rutt. The Macmillan Co., New York, June 1958. Price $5.95.

THE study of flower arrangement may be approached in several ways; however, the major principles of art or design are always observed and overlapped by the minor art principles. The design principles of proportion, balance, dominance and rhythm, with the elements line, form, pattern, texture and color, attain beauty, expressiveness and suitability.

Good proportion is pleasing relationship in size and shape among things or parts of things. In flower arranging good proportion is dependent on the background space, the plant material, theme and even the taste of the arranger.

The author cites the following examples of poor proportions:

1. Equal heights in container and plant materials.
2. Equal width and equal height in total arrangement.
3. Equal height of container and figurines.
4. A niche arrangement filling half of the space or less in height, in width, or in total volume.

Her examples of good proportions are:

1. Plant materials that are one and one-half times or more as high as a tall container.
2. Plant materials that are three times as wide as a low container.
3. An upright S design with two-thirds of the plant materials above the rim of the container.
4. A low, flat arrangement with only two-thirds of the water surface covered by the plant materials.

Scale refers to relative sizes only, not to shapes. In flower arrangement scale is affected by the room, placement, container to plant materials, plant materials to one another, and accessories to rest of the composition.

Balance is stability which is actual and visual. One must produce equilibrium by arranging objects on both sides of a central vertical axis so that opposing forces neutralize one another. There are two kinds of balance—symmetrical and asymmetrical in all arts. Oriental art is based on asymmetrical balance. In this as applied to flower arranging the plant material is not similarly arranged on both sides of an imaginary vertical axis through the center of the container. In symmetrical balance the weight and appearance of the plant materials are about the same on both sides of an imaginary vertical axis rising from the center of a symmetrical container and base.

A combination of symmetrical and asymmetrical balance in one arrangement may cause difficulties. For an asymmetrical design the container should not have two handles because they stress symmetry. Likewise an asymmetrical container like a pitcher, gravy boat, or a free form of any kind should not hold a symmetrical arrangement. An off-center arrangement does not look well when placed at the center of a symmetrical background space.

Dominance produces unity. There should be a dominant idea, movement, direction, line, texture, color and center of interest in a flower arrangement.

There must be rhythmic movement in line, form, pattern and color. Rhythm is found in all plant materials and the arranger should follow growth habits.

Repetition unifies the design. It is gained by repeating the leading line, the leading shape, the leading color and the leading texture. Transition is easy change; gradation and sequence are progressive change. All lines of an arrangement should converge at one place giving radiation. Variety adds stimulation and avoids monotony. Contrast gives opposition but must be controlled.

Line creates form or shape and by its placement depth is created. Pattern is the silhouette or outer shape of entire arrangement. All flower arrangements should have sufficient solids and voids. Voids are necessary to prevent a stuffy look. Texture is surface quality of plant material.

Plant materials have extreme variations in textures. Expert arrangers know that an insipid flower arrangement may be saved by addition of a strongly textured material. There must be agreement in texture between container and plant materials, among plant materials, between fabrics and other materials used, and some contrast is needed.

Color is the most compelling element. Pigment theory wheel of 18 hues is most practical for the flower arranger as it harmonizes best with interior finishes and plant materials. The primary colors are red, yellow and blue. If primary colors are mixed in quantities of two the secondary colors of orange, green and violet are achieved. Tertiary or intermediate colors are obtained by mixing a primary color with its nearest secondary. The qualities of color are hue (the name), value (lightness or darkness), and intensity (brightness or dullness). There are warm colors as well as neutral white, gray and black. There are many color harmonies too numerous to name here but in all cases one color should dominate and all else be subordinate. All art principles must be applied to color.

One objective in making a flower arrangement is to make it beautiful. Another is to make it express a definite idea. Expert arrangers usually prefer to make arrangements with themes. The author gives a classification by characteristics of flowers as to formality, informality, dignity, modesty and modernity which I thought was most interesting. As well, she gave helpful ideas and suggestions for flower show themes.

She explains period arrangements as traditional occidental flower arrangements that are a minor part of the three great decorative movements of Europe. From these periods we gained many useful styles which affect our homes, churches, clubs and flower shows today. In general we gained mass, color and much

symmetry from the occidentals. This has been added to the principles of Japanese line arrangement and our truly American contemporary as well as modern period gained. In this we have line, line-mass and mass-type arrangements.

Flower arrangements should be designed for the place to be used whether it be the home, club, church, etc. It is not always necessary to be flowers either; non-floral arrangements of foliage are most popular as are fruit and vegetable designs. Dry arrangements, weathered wood, weed and grass arrangements as well as landscape compositions are most usable.

In all instances, preparation of plant materials must be followed to achieve a good design. Containers must harmonize and good mechanics must be employed. The author gives many interesting exercises for the reader to practice on all types of designs which I feel are most valuable. Exhibiting and judging in classes asked for is important. Types of designs create interest, such as tables, pairs, miniatures, modern, juniors, etc. Judges must follow a scale of points for various classes and the exhibitor should be familiar with these also.

Whether using garden flowers, fruits or foliage, Mrs. Rutt consciously employs the principles and elements of good design. Those who practice flower arrangement first need to study. As I see it this book would not only help the beginner but the advanced arranger as well. School children should be aided by this book. I thoroughly enjoyed reviewing this book and heartily recommend it as helpful reading material to the arranger. I shall always cherish her concise explanations.

HELEN E. WOLFF

Guide List to Plants in the Strybing Arboretum by Eric Walther and Elizabeth McClintock. Strybing Arboretum Society, San Francisco, California, 1958. Price $1.00 paper backed; $3.50 bound.

WHEN we on the staff of the University of Washington Arboretum first saw this Guide List our immediate reaction was; "This is just what we should be publishing!" There are sixty-six pages, listing alphabetically by scientific name the many plants growing in the Strybing Arboretum, their family, place of origin and location in the Arboretum. In addition, the common name is given where one exists, with an index to these. There are two fine maps inside the front and back covers, one of Golden Gate Park and one, more detailed, of the Arboretum itself.

An Arboretum or Botanic Garden is a living organism, composed of "cells" or plants that live and die, or are replaced and added to, much as are the cells of any other organism. It is always in a state of flux, while a printed guide is static by its very nature; hence any list of these plants is to some extent outdated even before it is published. Nevertheless this type of guide is invaluable to an Arboretum since it helps the visitor locate specimens that interest him with a minimum of effort, and also gives a very considerable amount of information on what can be grown in the area served by the Arboretum.

In regard to this latter aspect, the list of plants growing at the Strybing Arboretum and Botanic Garden is very impressive, ranging from redwoods of California to rock cress from the Caucasus Mountains of Europe. This range reflects the temperate climate of the Bay region, where the Arboretum has over one hundred and thirty hybrids and species of rhododendrons, many of which we are unable to grow outside, as well as plants from South America, New Zealand, Australia, and South Africa—species we cannot keep through even our relatively mild winters.

It is to be hoped that when we are able to publish our guide list that it will be comparable to this fine work.

J. A.W.

Propagation of Woody Plants by Cuttings, U. of Massachusetts Experiment Station Bulletin No. 491, June 1957, by William L. Doran.

THERE has been "so much said, and, on the whole, so well said" on the subject of Propagation of Woody Plants by Cuttings that it is hard to believe that a bulletin of less than a hundred pages could add so much useful information on that subject. But Professor William L. Doran, of the Department of Botany of the University of Massachusetts, has condensed a wealth of exact detail into that institution's Experiment Station Bulletin No. 491, of which copies are available from the Arboretum Foundation office, price 55 cents each.

Professor Doran carefully avoids misleading generalities while stressing the number of factors which influence results in work with cuttings of woody plants. Many more species are listed than are customarily covered in such a project.

Importance is attached to individual plant differences within a species as well as to ripeness of wood and age of actual plant, to nodal relation to cut, to amount of leaf surface left on cutting, to timing and its variance when root inducing substances are used, and to climatic influence and its variability from year to year. The foregoing factors bear on the making of the cuttings, while others attend their handling in the propagating bench or frame. Some of the latter on which the author gives data are the value of humidity and how to provide it, rooting media, ventilation, temperature and lighting.

The bibliography appended to the text of this bulletin gives evidence of the vast amount of research involved in approaching the subject, especially since references to the printed words of others are included with the tabulations of "Results Obtained With Individual Species."

Here is a ready reference book in compact form bulging with usable information. Commercial propagators and hobby gardeners alike will rely on it.

FRANCES KINNE ROBERSON

Plant Materials for Landscaping. Extension Bulletin 758, compiled by Donald J. Martel, head, Department of Landscape Architecture, Oregon State College, Jan., 1957.

MR. MARTEL takes a new approach to the cataloging of landscape plant material by classifying some 400 plant varieties according to their various average heights; namely, Low Plants 6 to 12 inches high, Small Plants 1½ to 3 feet high, Medium Plants 4 to 5 feet high, Large Shrubs 6 to 8 feet high, and Tall Shrubs and Shrubby Trees at 8 to 20 feet high. He further

qualifies the average height as the expected height to be attained under average cultural conditions within a period of 3 to 10 years.

The list of plants selected is pointed towards the average home owner who knows little about the expected ultimate heights of these materials and admittedly cares little what happens to the size of the plant beyond a ten-year period. This reasoning could account for classifying Rhododendron "Bow Bells" and "Blue Tit" along with *R. Williamsianum* in the 1½- to 3-foot category.

Beyond the classification of plants as to size, there is a concise resumé of each plant's habit of growth, color and season of flower, preference for sun or shade, and hardiness factors pertinent to the State of Oregon, but quite applicable to similar geographical zones in Washington.

This 46-page Extension Bulletin No. 758 therefore makes a handy reference or check list of the most common landscape materials. Available for 15 cents from the Federal Cooperative Extension Service, Oregon State College, Corvallis, Oregon.

CASH M. BEARDSLEY

HYPONeX®
SOLUBLE PLANT FOOD COMPLETE
Grows Better Plants in Soil, Sand or Water
Simply dissolve and water all your house plants, garden flowers, vegetables, shrubs and lawn. Feeds instantly. If dealer can't supply send $1 for 1 lb. Makes 100 Gals.
Guaranteed by Good Housekeeping
REPLACEMENT OR REFUND OF MONEY IF NOT AS ADVERTISED THEREIN
HYDROPONIC CHEM. CO., Copley, Ohio, U.S.A.

PUT FALL COLOR IN YOUR GARDEN

with

LIQUIDAMBAR — SWEETGUM
(For Brilliant Color)

OAK—Pin, Scarlet or White

OAK—For Beautiful Shade Trees

Larger size trees grow quickly
Do more for you

Evergreen Live Oaks are different

HOPKINS NURSERY

On Bothell-Kirkland Highway

15028 100th Ave. N. E. Bothell

HUnter 6-2061

KINNIKINNICK

Arctostaphylos uva-ursi
Arctostaphylos media

Excellent for Ground Cover

75 Cents Each and up

L. N. ROBERSON NURSERY

1540 East 102nd Street
SEATTLE 55, WASHINGTON

Western Oaks for Western Horticulture

(Continued from Page 78)

branchlets become long and pendulous, and may even sweep to the ground. The deeply lobed, deciduous leaves are dark green above and much paler beneath. The well-known "Hooker Oak" near Chico, California, named for the renowned British botanist of the last century, Sir Joseph Hooker, is the largest known tree of this species. Standing 110 feet in height, it has a tremendous crown that measures 151 feet across and a massive trunk measuring approximately 8 feet in diameter.

The Valley Oak reaches its optimal development in deep soils of interior valleys where the water table is not far below the surface. Under such conditions it often proves a striking exception to the well-known dictum that oaks are slow-growing. One tree in a front lawn in Davis, planted in 1938, has now reached a height of 54 feet and has a trunk diameter of 23¾ inches at 4½ feet above the ground. Tolerant of the long hot summers of interior regions and the frequently moderate alkalinity of our valley soils, this oak seems to shrink from coastal influences. Indeed, it is consistently absent from valleys exposed to the sea. When planted in coastal areas (e.g., at Santa Barbara), the Valley Oak seems to be quite susceptible to mildew.

This handsome tree deserves more abundant use in the interior valleys of its native state, and is certainly worthy of trial in areas both north and south of its natural range.

8. *Quercus oblongifolia* Torr.
Mexican Blue Oak

Mexican Blue Oak is commonly a small tree 20 to 25 feet in height, occasional large specimens being 35 feet in height. The low, often broadly spreading crown bears a canopy of pale bluish-glaucous foliage, the leaves remaining on the tree during the winter months but dropping a short time before the new growth appears in spring. This is the first oak encountered as one leaves the desert proper and enters the low oak woodland, or *encinal,* on the foothills of desert mountain ranges in southern Arizona and adjacent northern Mexico.

The subdued colors of this sturdy little tree give it a distinctive charm all its own. Of all the Arizona oaks, this is my favorite. The small size, the clean bluish cast of the foliage, the ashy-white trunk bark, and its heat and drought tolerance, make it ideal as a specimen or street tree for hot interior localities, where a cool, subdued effect is desired. Probably not hardy in areas subject to severe frost.

9. *Quercus viminea* Trel.
Osier Oak

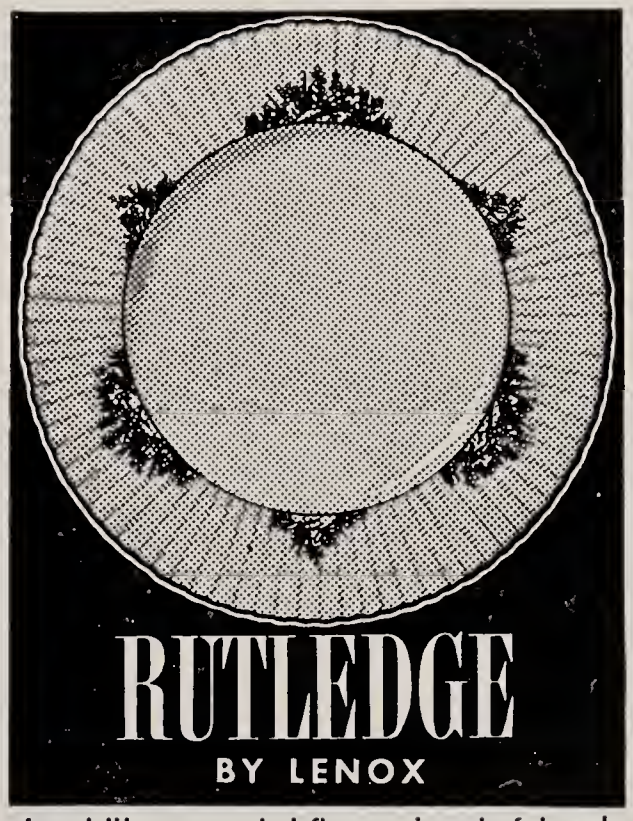
This is a very graceful tree ultimately attaining heights of as much as 35 to 40 feet, although commonly smaller, with dark, blackish bark, a slender, strictly erect trunk which branches upward, and delicate, open, glossy yellow-green foliage. It has much the appearance of some of the phyllode-bearing acacias, but with more attractive, glossy foliage. This is a tree of the pine-oak woodland of the higher mountains in the region of the Sierra Madre Occidental of eastern Sonora and western Chihuahua. Although entirely Mexican in its distribution, its northernmost outpost, on the Sierra de los Pinitos, is a mere 15 miles south of the Arizona border, and lies virtually within sight of Nogales, Arizona.

In my opinion, this pretty little tree is the most gracefully attractive of all the oaks of northwestern Mexico. The small size, graceful erect habit, and handsome, glossy, evergreen foliage should make it a fine street tree for frost-free regions of Arizona and California. (Acorns collected by the writer in Chihuahua in late August, 1952, failed to germinate at Davis several weeks later. Probably they had dried too long. Probably not hardy in areas subject to severe frost.

10. *Quercus Wislizenii* A.DC.
Interior Live Oak

This evergreen oak is commonly a medium-sized tree 30 to 50 feet in height (exceptionally to 75 feet). In mature trees, the widely spreading branches form a dense, rounded crown which is often broader than high; the small leaves are an attractive, glossy green. Interior Live Oak, as its name suggests, frequents interior foothills and valleys in California, reaching its optimal development along the east side of the Great Valley. Its range extends into southern California and Baja California, but here it occurs mainly as a shrub in chaparral areas. A handsome tree for spacious lawns and parks, this oak, because of the broadly spreading habit at maturity, should not be used for street tree planting unless it has adequate room in which to develop.

FRIEDLANDER AND SONS



Jewel-like, enameled flowers in colorful rock gardens. 5-piece plate setting.....$23.95

no money down—24 months to pay

FRIEDLANDER AND SONS

FIFTH AT PIKE
Open Monday night until 9

MA 2-7670

NORTHGATE
Open Wed. & Fri. nights until 9:30

FURNEY'S HI-LINE NURSERY

One of the Northwest's Finest Propagators and Growers of Over 350 Choice Landscape Items

21215 Pacific Highway South
TRinity 8-8761

Specialize in

RHODODENDRONS • AZALEAS
MAGNOLIAS
RARE ROCKERY PLANTS
MAPLES

LEM NURSERY

19215 AURORA AVENUE

Junction
FEED & SEED STORE
4747 California Avenue
Seattle 16, Washington
WEst 2-6822

COURTESY OF

Mt. Rainier Bulb Co.

1115 POST STREET

BEAUTIFUL FLOWERING SHRUBS AND TREES
Visit us for all your BROAD-LEAVED EVERGREENS and also for UNUSUAL SHRUBS, PLANTS and TREES

BONNYBROOK NURSERY

KIRKLAND-BOTHELL HIGHWAY
VAndyke 2-5917

VISIT MALMO'S GARDEN CENTER

Wise gardeners know there's a world of difference in Malmo plants. Malmo's are plant specialists with over 65 years of experience growing top quality nursery stock—in all the newer, finer varieties.

It pays to insist on
MALMO QUALITY

- RHODODENDRONS
- AZALEAS
- FLOWERING TREES
- ROSES
- CAMELLIAS
- HEATHERS
- MAGNOLIAS
- FRUIT TREES

FREE LANDSCAPE SERVICE
Malmo Landscaping will add to the value of your home and increase the pleasures of outdoor living. We'll show you how quickly and inexpensively it can be done.
EASIEST TERMS
Come in or phone Today
LAkeview 4-2800

Unlimited Parking — Charge Accounts Invited

Malmo Nurseries

Growers of Finest Quality Nursery Stock

Seattle Nurserymen Since 1893 — **4700 25th Ave. N.E.**

The Northwest's Most Complete Garden Shopping Center

DEODORIZED!

ALASKA
FISH FERTILIZER

100% ORGANIC ALL FISH

NOW HAS **T. C. B.**

HELPS PREVENT *Mildew*

WHEN APPLIED TO FOLIAGE

DOG AND CAT REPELLANT ADDED

Stock Cole's Earthworth-Conditioned Plant Soil for Fast Selling and Repeat Orders

Write for Catalogue Sheet to

COLE BAIT COMPANY

CHerry 2-1174 • 12617 34th South

REARDON WHOLESALE NURSERY

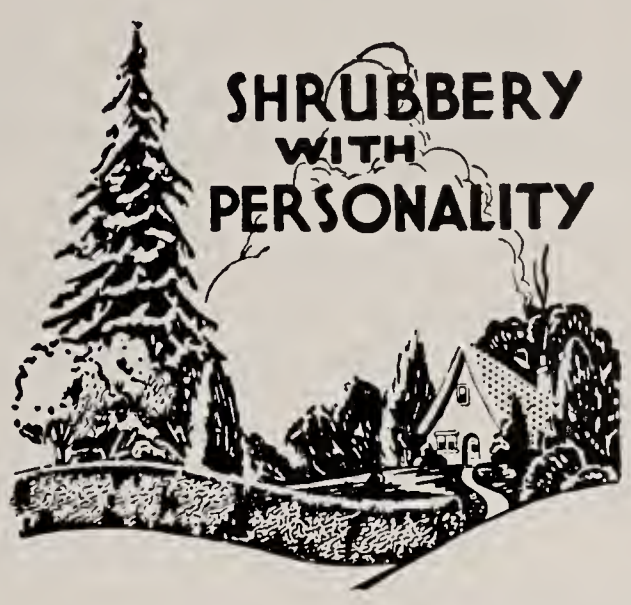
Rhododendrons

Azaleas

Heather

14244 First Avenue South

Phone CHerry 3-4134



BEAUTIFY YOUR GARDEN

S H R U B B E R Y

AZALEAS • CAMELLIAS

FLOWERING TREES

DWARF FRUIT TREES

RHODODENDRONS

SEEDS • FERTILIZERS

INSECTICIDES

GARDEN TOOLS

POWER MOWERS

ALL YOUR GARDEN NEEDS

OPEN 7 DAYS A WEEK
FOR YOUR CONVENIENCE

5 CORNERS NURSERIES
LANDSCAPING
AND GARDEN STORE

FIRST AVENUE SOUTH
AT SOUTH 160TH STREET

CHerry 2-2931

Oaks at the U. B. C. Botanical Garden, Vancouver, B. C.

(Continued from Page 85)

true from seed and time alone will tell what form many of these will take. A few of the species and varieties listed have not been positively identified but are included here to indicate the extent of the collection.

Shell Heating Oils • Furnaces
Plants, Shrubs, Tools and Supplies for the Garden
Flowers for all Occasions.

Viewlands Fuel and Garden Center
10535 Greenwood Avenue
EM 4-3900

USE a MODERN Plant Food!
MORE BEAUTIFUL — HEALTHY PLANTS
NO SEPARATION — EACH PELLET
A COMPLETE PLANT FOOD

- PELLETED
- ODORLESS
- DUST-FREE
- FREE-FLOWING
- EFFECTIVE

6-10-4 ANALYSIS
MINOR ELEMENTS

50 Lb. Economy Bag
2.75

GARDEN CLUB
GRANULATED PLANT FOOD

PREVENT ROT
WITH
CUPROLIGNUM

Rot is expensive and inconvenient when it rots your

COLD FRAMES — GARDEN STAKES
SEED FLATS — TRELLISES
WINDOW BOXES — HOTHOUSE BENCHES
ETC.

Where there is CUPROLIGNUM
there is NO ROT

Sold by Most Lumber Yards and Hardware Dealers

Manufacturers
Rudd Paint & Varnish Co.
SEATTLE
Sole Distributors RUDD & CUMMINGS
1608 15th Ave. W. — SEATTLE, WASH.

SHADE TREES

OAKS
. . . LARGEST SELECTION IN THE AREA

MAPLES
. . . MANY VARIETIES

See Strander for trees of all sizes.

Tremendous selection.

STRANDER
NURSERIES
13310 Interurban South
Seattle 88, Washington

Washington Association of Ground Sprayers

Chemical applicators and plant experts . . . State tested and licensed. For professional insect, slug and weed control, soil sterilization, liquid fertilizing or pruning,

Call one of the following:

SPRAGUE SPRAY SERVICE — **EMerson 2-2542**
GEORGE MOCK, JR., *Owner*
Money-Back Guarantee on Peach Leaf Curl
14756 27th Avenue N.E.

ROBERT M. DYE — **EMerson 2-4944**
20063 19th Avenue N.E.

EASTSIDE SPRAYING & FOGGING SERVICE — **VAndyke 2-2112**
10021 126th N.E., Kirkland

GREENUP SPRAY SERVICE — **WEst 5-2095**
10217 2nd Avenue S.W.

WASHINGTON TREE SERVICE — **EMerson 2-9620**
17868 28th Avenue N.E.

SEATTLE SPRAYING & TREE SERVICE — **SUnset 3-2633**
FLOYD MCKEEVER, *Owner*
8511 Linden Avenue

SCARBERY SPRAY SERVICE — **CHerry 2-1191**
13804 24th Avenue South

ARTHUR E. FAIRBANKS — **EMerson 3-7333**
10730 24th Avenue N.E.

REGIONAL CHEMICALS — **EMerson 2-2542**
Originators of Slug-fest, Liquid Slug Killer
14756 27th Ave. N.E.

SEE US FOR

A good selection of No. 1

ROSES **2-year old Oregon grown**

The best of the old favorites, and the new patented varieties.

—AND—

Our heavy, well-branched

FRUIT TREES **Dwarf and Standard**

—AND—

Our stock of deciduous

FLOWERING SHRUBS

SHADE TREES

ORNAMENTAL

FLOWERING TREES

Cane Type Berry Plants, etc.

—AND—

Most any variety of

HEATHER **you may desire**

—AND—

GARDENING NEEDS

—PLUS—

Free Landscaping Estimates

DESCRIPTIVE PRICE LIST UPON REQUEST

SPRING HOURS, 8 A.M. TO 6 P.M. EVERY DAY

LI 2-4611

"Our Business Is Growing"

RICHMOND NURSERIES

Seattle-Everett Highway (Aurora) to Richmond Highlands (N. 185th), 1 Mile West on Richmond Beach Road.

Since 1903

WIGHT'S NURSERY

Rhododendrons

Azaleas

Flowering and Fruit Trees

Annuals and Perennials

BAMBOO

Address

6110 N.E. Bothell Way

Phone HUnter 6-3258

Located at Kenmore

TOP SOILS • MANURES

MULCHES

SOIL MIXTURES

ROCKERY ROCK

FAST DELIVERY SERVICE

Phones

PLANT—HUnter 6-3930

HOME—EMerson 2-5693

Bassett's Gro-Earth

Mail Address

17050 Brookside Blvd.
Seattle 55, Wash.

Plant at Alaska Road
2 miles north of Kenmore

FALL IS TREE PLANTING TIME

There are available in choice large specimen trees in the following varieties:

LIRIODENDRON
AMERICAN LINDENS
CATALPA

PYRAMID LINDENS
CUTLEAF WEEPING BIRCH
EUROPEAN WHITE BIRCH

MAPLES—Japanese Lace and cutleaf varieties. Red cutleaf tree type, Red lace tree type, Green lace tree type, Green cutleaf tree type.

In Bush and Spreading Varieties.
We have green, gold, and red in the laceleaf type.

In large shade trees we have Crimson, King, Acer rubrum and Acer palmatum. Rose Locust, Moraine Honey Locust, Oriental Poplar, Scarlet Oaks, Pin Oaks and Top grafted Elms. Also Faassen's Black and Schwedleri.

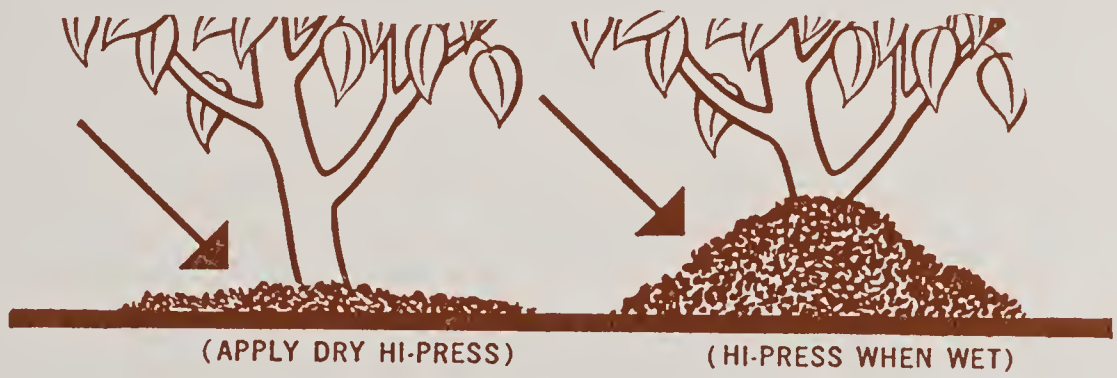
TREE WISTERIAS—In Blue, Purple, White and Pink in sizes from two-foot spread to four-foot spread.

FLOWERING CRABS—35 varieties; FLOWERING CHERRIES—15 varieties; DOGWOODS—White, Pink, Korean, Variegated White to Yellow, Gold, Variegated Pink, Purple and White.

Charge Accounts Invited

anhalt's shur-gro nurseries

5020 25th Avenue Northeast — LA 3-5000



GUARD AGAINST FREEZE WITH HI-PRESS PEAT MOSS

Mulch one half inch of HI-PRESS around garden plants. When wet, HI-PRESS expands 6 times into a long-lasting protective cone of pure Sphagnum Moss, insulating against winter cold. Work this mulch into the soil this spring as a conditioner.

HI-PRESS Peat Moss

Available at all Leading

GARDEN SUPPLY STORES

THE ARBORETUM BULLETIN

Published by the
Arboretum Foundation
University of Washington Arboretum
Seattle 5, Washington

BULK RATE
U. S. POSTAGE PAID
SEATTLE, WASHINGTON
Permit No. 413

POSTMASTER: If addressee has removed, please notify us of new address on Form 3547, postage for which is guaranteed.

BOXED TREES

. . . specimens . . . smaller sizes

OAKS *pyramidal, pin, red*
BIRCH *pyramidal, cut leaf*
MAPLE *trident*
PINE

PRENTICE
Nursery and Decorating Co.
9252 E. MARGINAL WAY • PArkway 2-0842